

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
23 October 2003 (23.10.2003)

PCT

(10) International Publication Number  
**WO 03/087463 A1**

(51) International Patent Classification<sup>7</sup>: **D06F 58/20**

(21) International Application Number: PCT/US03/10892

(22) International Filing Date: 9 April 2003 (09.04.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

10/121,440 10 April 2002 (10.04.2002) US  
10/411,062 9 April 2003 (09.04.2003) US

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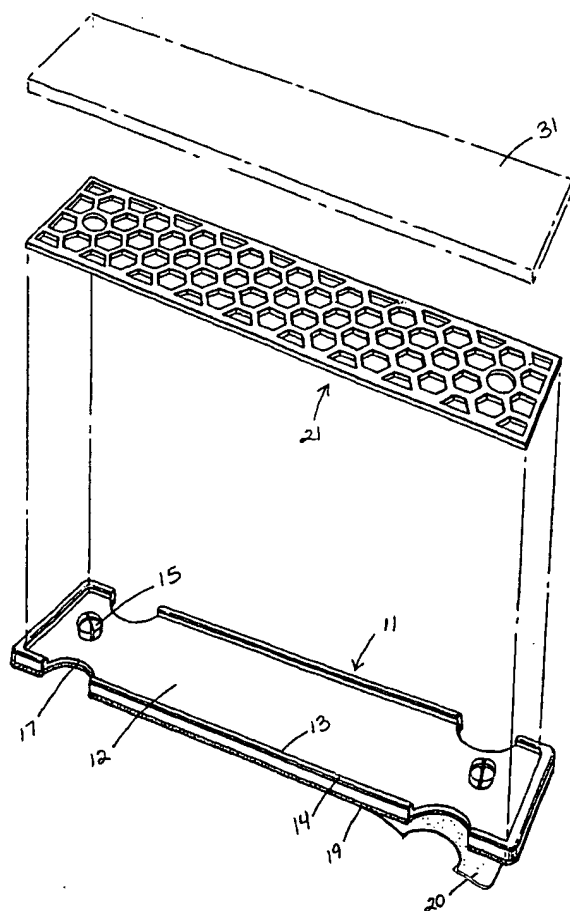
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(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,

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(54) Title: PRODUCT DISPENSER AND CARRIER



(57) Abstract: A product dispenser and carrier (10) for attachment to a surface such as an inner surface of a dryer includes a plate member (11) and a product carrier (21). The plate member (11) attaches to the surface and the product carrier (21) releasably attaches to the plate member (11). Product (31) is operatively connected to the product carrier (21).

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MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD,  
SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ,  
VC, VN, YU, ZA, ZM, ZW.

SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,  
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

- with international search report
- with amended claims

**(84) Designated States (regional):** ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## PRODUCT DISPENSER AND CARRIER

### Background of the Invention

#### 1. Field of the Invention

5           The present invention relates to a product dispenser and carrier, and more particularly, the present invention relates to a product dispenser and carrier for dispensing a solid fabric conditioner inside a dryer.

#### 2. Description of the Prior Art

10           Laundry additives are commonly applied to laundry via a liquid either prior to or during the wash cycle or via a treated sheet during the dryer cycle. Laundry may be pre-treated prior to the wash cycle, or the liquid additive mixes with the water during the wash cycle to contact the laundry. The treated sheet tumbles around in the dryer during the dryer cycle to contact the laundry. For best results, either another dose of the liquid or a new treated sheet must be applied each time.

15           Although treated sheets may be used more than one time, they become much less effective with each subsequent cycle. Therefore, using a new treated sheet each time works best to have consistent, effective results on the laundry. In addition, other types of laundry products can be applied prior to placing the laundry in either the washer and/or the dryer. For example, pre-treatment products in either a liquid or a

20           semi-solid form may be applied to the laundry. However, again these products must be applied to the laundry each time before the appropriate cycle.

### Summary of the Invention

25           In a preferred embodiment dispenser for attachment to a surface, a plate member has a front side, a back side, and an attachment member and a product carrier has a first side, a second side, and a mating member. The mating member is configured and arranged to engage the attachment member thereby releasably connecting the plate member and the product carrier. The product carrier is replaceable. A solid product is operatively connected to the product carrier, and the

30           solid product extends from the first side of the product carrier away from the plate

member and the second side of the product carrier faces the front side of the plate member.

5 In a preferred embodiment method for dispensing a product, a plate member is attached to a surface. The plate member has a front side, a back side, and an attachment member. The back side includes a connecting member operatively connecting the back side to the surface. A carrier is attached to the plate member. The carrier has a mating member, a first side, and a second side. The mating member is configured and arranged to releasably engage the attachment member. The carrier carries the product and is replaceable.

10 In a preferred embodiment method of dispensing a fabric conditioner in a dryer, a fabric conditioner is operatively connected to a product carrier, and the fabric conditioner has rounded edges. The product carrier is attached to an inner surface of the dryer, and the dryer is allowed to run through a dryer cycle. A consistent, optimum dose of the fabric conditioner is dispensed from an initial cycle  
15 to a final cycle until the fabric conditioner has become depleted.

#### Brief Description of the Drawings

Figure 1 shows a product dispenser and carrier constructed according to the principles of the present invention attached to a dryer fin;

20 Figure 2 is a top perspective view of the product dispenser and carrier shown in Figure 1;

Figure 3 is an exploded top perspective view of the product dispenser and carrier shown in Figure 1;

25 Figure 4 is a top perspective view of a portion of the product carrier shown in Figure 3;

Figure 5 is a top perspective view of the portion of the product carrier shown in Figure 4 with product on the product carrier;

Figure 6 is a bottom perspective view of a portion of the product carrier shown in Figure 3;

Figure 7 is a bottom perspective view of the portion of the product carrier shown in Figure 6 with product on the product carrier and the product dispenser attached thereto;

5 Figure 8 is an exploded top perspective view of another embodiment product dispenser and carrier constructed according to the principles of the present invention;

Figure 9 is an end view of the product dispenser and carrier shown in Figure 8 attached to a dryer fin;

10 Figure 10 is an exploded top perspective view of another embodiment product dispenser and carrier constructed according to the principles of the present invention;

Figure 11a is an exploded bottom perspective view of another embodiment product dispenser and carrier constructed according to the principles of the present invention;

15 Figure 11b is an exploded side view of the product dispenser and carrier shown in Figure 11a;

Figure 12 is an exploded top perspective view of another embodiment product dispenser and carrier constructed according to the principles of the present invention;

20 Figure 13 is an exploded top perspective view of another embodiment product dispenser and carrier constructed according to the principles of the present invention;

Figure 14 is a bottom perspective view of the carrier shown in Figure 13 with a product operatively connected to half of the carrier;

25 Figure 15 is a cross sectional view of a solid product on the product carrier taken along the line 15-15 of Figure 14;

Figure 16a is a side view of a solid product having a half-cylindrical narrow shape and a high dome;

Figure 16b is an end view of the solid product shown in Figure 16a;

Figure 17a is a side view of a solid product having a half-cylindrical narrow shape and a high dome with rounded top edges;

Figure 17b is an end view of the solid product shown in Figure 17a;

Figure 18a is a side view of a solid product having a half-cylindrical wide shape and a low dome;

Figure 18b is an end view of the solid product shown in Figure 18a;

Figure 19a is a side view of a solid product having a half-cylindrical wide shape and a low dome with rounded top edges;

Figure 19b is an end view of the solid product shown in Figure 19a;

Figure 20 is a graph showing the dispensing rates of the solid products shown in Figures 16a and 17a;

Figure 21 is a graph showing the dispensing rates of the solid products shown in Figures 18a and 19a;

Figure 22 is an exploded side perspective view of another embodiment product dispenser and carrier constructed according to the principles of the present invention;

Figure 23 is a cross sectional view of an aperture taken along the lines 23-23 in Figure 13;

Figure 24a is a back view of a plate member of the product dispenser and carrier shown in Figure 13;

Figure 24b is a back view of another embodiment plate member of the product dispenser and carrier shown in Figure 13;

Figure 25 shows another embodiment product dispenser and carrier constructed according to the principles of the present invention operatively connected to a dryer fin; and

Figure 26 is a top perspective view of a dispenser of the product dispenser and carrier of Figure 25 incorporated into the dryer fin.

### Detailed Description of the Preferred Embodiment

Product dispensers and carriers constructed according to the principles of the present invention are designated by the numerals 10, 110, 210, 310, 410, 510, and 610 in the drawings.

5 In one preferred embodiment, the product dispenser and carrier 10 includes a plate member 11 and a product carrier 21, which carries a product 31. An assembled product dispenser and carrier 10 is shown in Figure 2, and an exploded view of the product dispenser and carrier 10 is shown in Figure 3. Generally, the product carrier 21 is operatively connected to the plate member 11, which may be attached to a  
10 surface such as a fin 41 of a dryer 40, as shown in Figure 1, to dispense the product 31 such as a solid fabric conditioner. Although the invention is described for use with fabric softeners, other products such as sanitizers, water repellants, deodorizers, bleaches, soil repellants, dye-transfer inhibitors, fiber protecting polymers, fiber smoothers, UV light absorbers, anti-wrinkle agents, and etc. could also be used.  
15 Therefore, the present invention is not limited to use with fabric softeners.

The plate member 11 is rectangular in shape having dimensions of approximately 9 3/8 inches long by 2 3/8 inches wide by 1/4 inch thick and is made of a high melt point plastic such as nylon or high impact polypropylene. It is recognized that other suitable high melt point plastics known in the art may also be  
20 used. The plate member 11 includes a front side 12 and a back side 18. The front side 12 has a perimeter 13, which is surrounded by a rail member 14. The rail member 14 protrudes slightly outward from the front side 12 and has rounded edges thereby creating a recessed area to accept and border the product carrier 21 within the rail member 14. The front side 12 also includes an attachment member 15,  
25 which in the preferred embodiment is a pair of hole plugs to provide releasable attachment means for operatively connecting the product carrier 21 to the plate member 11. One hole plug is located on each end of the plate member 11 and is configured and arranged to accommodate holes in the product carrier 21. The hole plugs are cylindrical and mushroom shaped with two slits at right angles to each  
30 other thereby dividing the hole plugs into four equal segments. The four segments

allow the hole plugs to releasably engage the holes. As the hole plugs are pushed into the holes, the segments are brought closer together allowing the holes to snap down over the mushroom portion, which then protrudes from the holes and the segments are allowed to spread apart again thereby holding the product carrier 21 onto the plate member 11. The hole plugs could also be square in shape with an arrow head and a slit dividing the hole plug in two segments parallel to the arrow head, as shown in Figures 11a and 11b. To release the product carrier 21 from the hole plugs, the holes are brought over the mushroom portion of the hole plugs thereby bringing the segments together to allow the holes to pull over the mushroom portion and be released. The hole plugs may be molded as part of the plate member 11. However, the hole plugs 15 may also be molded as part of the product carrier 21 and engage holes 24 in the plate member 11 as shown in Figure 10. Alternatively, the hole plugs could be a purchased part such as those commercially available from ITW Fastex, part number 207-241141-00 rather than molding them as part of the plate member 11 or product carrier 21. Although hole plugs and holes are shown in the preferred embodiment, it is understood that other attachment means such as snaps, VELCRO®, and other means known in the art may be used to connect the product carrier 21 to the plate member 11. The plate member 11 also includes indentations 17, which allow easy removal of the product carrier 21 when the product 31 has been depleted and the product carrier 21 must be replaced with a new product carrier, on each side near each end of the plate member 11. The indentations are sized and arranged to make removal of the product carrier 21 easy with one's fingers. Also, the product carrier 21 may simply be removed if dispensing of the particular product is not desired.

The back side 18 of the plate member 11 includes an adhesive 19, which is used to operatively connect the plate member 11 to a surface. The adhesive 19 in the preferred embodiment is a double-sided foam back tape manufactured by 3M, part number 4084, having a paper backing 20. The paper backing 20 may be removed when it is desired to attach the plate member 11 to a surface. Again, it is understood that other connecting means may be used to operatively connect the plate



member 11 to a surface such as using VELCRO®, screws, magnets, and other means well known in the art.

The product carrier 21 is also rectangular in shape and is configured and arranged to fit within the rail 14 of the plate member 11. The product carrier 21 is approximately 9 inches long by 2 inches wide by 1/8 inch thick and is made of a high melt point plastic. The product carrier includes a first side 22 and a second side 23, which are shown in Figures 4 and 6, respectively. The first side 22 faces outward from the plate member 11 while the second side 23 faces the front side 12 of the plate member 11. A mating member 24, which engages the attachment member 15, is also included in the product carrier 21. In the preferred embodiment, the mating member 24 is a pair of holes having diameters of approximately 3/8 inch, one hole located on each side of the product carrier 21 and configured and arranged to releasably engage each of the hole plugs in the plate member 11 as described above. The holes could also be oval in shape to accommodate either round or square hole plugs, as shown in Figure 11a, and the oval shape would ensure that the hole plugs would fit should any shrinkage of the holes occur from exposure to the heat of the dryer. A plurality of apertures 25 approximately 3/8 inch in diameter are arranged on the product carrier, and in the preferred embodiment, the plurality of apertures 25 are hexagon shaped and are arranged in a nonlinear, honeycomb fashion. This nonlinear, honeycomb arrangement of the apertures 25 strengthens the product carrier 21 and prevents the product 31 from breaking and shearing from the product carrier 21. In addition, one preferred embodiment apertures 25 are countersunk or back beveled on the second side 23 to form a rivet like structure when the product 31 is applied to the product carrier 21. The apertures 25 may also be tapered from the first side 22 to the second side 23 rather than being countersunk. The countersunk portion 26 of apertures 25 allows the product 31 to be securely attached to the product carrier 21, as would a tapered aperture, and this is described more fully below. The product carrier 21 containing product 31 is disposable and replaceable once the product 31 has been depleted on the product carrier 21.

The product 31 is preferably a solid product that is cast or extruded onto the first side 22 of the product carrier 21, as shown in Figure 5. However, the product 31 could also be glued, attached with VELCRO®, or otherwise operatively connected by means well known in the art to the product carrier 21. As the product 31 is being cast or extruded onto the first side 22 of the product carrier 21, the product 31 fills in the apertures 25, and the countersunk portions 26 of apertures 25 allow the product 31 to fan or spread out proximate the second side 23 of the product carrier 21. When the product 31 solidifies onto the product carrier 21, this fanning or spreading out of the product 31 in the countersunk portions 26 proximate the second side 23 holds the product 31 onto the first side 22 of the product carrier 21, as shown in Figure 7. A substantial portion of the product 31 extends from the first side 22 of the product carrier 21 away from the plate member 11 and the second side 23 of the product carrier 21 faces the front side 12 of the plate member 11. The substantial portion being at least about 85% of the product 31 on the side of the carrier 21 from which the product 31 is dispensed. The product 31 extends approximately 3/4 inch from the first side 22 of the product carrier 21. The preferred embodiment utilizes a solid fabric softener as the product 31 that is fixedly cast or extruded onto the product carrier 21. The solid fabric softener is described in U.S. Patent Application Serial No. 10/120,891, filed April 10, 2002, entitled Fabric Softener Composition and Methods for Manufacturing and Using, which is incorporated by reference herein.

In operation, the paper 20 is peeled from the adhesive 19 operatively connected to the back side 18 of the plate member 11, and the adhesive 19 is applied to a surface such as a dryer fin 41 thereby operatively connecting the plate member 11 to the surface. Then, the product carrier 21 carrying product 31 is attached to the plate member 11. The attachment member 15 of the plate member 11 is configured and arranged to engage the mating member 24 of the product carrier 21. In the preferred embodiment, the attachment member 15 is a pair of holes on each side of the plate member 11 and the mating member 24 is a pair of hole plugs on each side of the product carrier 21 configured and arranged to releasably engage the holes. As

described above, the hole plugs snap into the holes. When the product carrier 21 is attached to the plate member 11, the rail member 14 of the plate member 11 surrounds the edges and corners of the product carrier 21 thereby preventing items from getting caught or snagged on the edges and corners of the product carrier 21.

- 5 The product 31 is then ready for dispensing. Only a small portion of the product 31 is depleted during each use. In the preferred embodiment fabric softener, approximately 1 to 3 grams of product is dispensed per cycle. Therefore, the product carrier 21 carrying the product 31 can be used for several applications. However, this amount of product will vary depending upon the type of product
- 10 being dispensed, the chemical composition of the product, the size of the product, the size of the dryer, etc. Ideally, a consistent, optimum dose will be dispensed from the first cycle to the last cycle resulting in a relatively even dispense curve, as shown in Figures 20 and 21. When the product 31 becomes depleted, the empty product carrier 21 can be replaced with a second product carrier carrying product, and the
- 15 empty product carrier 21 can be thrown away. Alternatively, the product carrier 21 could be removed if dispensing of the product 31 is not desired.

- In another preferred embodiment, shown in Figures 8 and 9, the product dispenser and carrier 110 includes a mount 111 and a product carrier 121. The mount 111 is made of a high melt point plastic and is generally wedge shaped
- 20 having dimensions of approximately 9 3/8 inches long by 2 3/8 inches wide and the first end 116 is 1/4 inch thick and the second end 117 is 3/8 inch thick. Therefore, an end view of the mount 111 resembles a generally triangular shape with one side being thicker than the other, opposing side, forming an angle of approximately 10 degrees. The angle may vary depending upon the product to be dispensed to
- 25 maximize the even dispensing of the product. The front side 112 includes an attachment member 115, which is a flange, proximate the first end 116 and the second end 117. The back side 118 includes an adhesive 119, similar to the adhesive 19 of the previously mentioned preferred embodiment, with paper backing 120.

The product carrier 121 has a first side 122, a second side 123, a first end 116, and a second end 117. Also made of a high melt point plastic, the dimensions of the product carrier are approximately 9 3/8 inches long by 2 3/8 inches wide by 3/16 inch thick. It is recognized that the dimensions are for illustrative purposes only and any dimensions suitable for the intended purpose are acceptable. The product carrier 121 is an extruded plastic part with dove tail grooves along the length of the product carrier 121 on the first side 122. The dove tail grooves 125 are approximately 1/8 inch deep. The dove tail grooves 125 hold the product 131 onto the first side 122 of the product carrier 121, in a similar fashion as the countersunk portions 26 hold the product 31 onto the product carrier 21. Also included on the product carrier 121 is mating member 124, which is a leg extending from each of the edges running along the length of the product carrier 121 to engage the flange 115 of the mount 111. The legs can either snap onto the flanges or the product carrier 121 may be slid onto the mount 111 to operatively connect the components. The product 131 is similarly cast or extruded onto the first side 122 of the product carrier 121 and held in place by the dove tail grooves 125. Because the mount 111 is wedge shaped, the product 131 is disposed at an angle relative to the surface upon which the mount 111 is operatively connected to maximize the amount of product 131 dispensed and to ensure that the product 131 is dispensed evenly.

In operation, the paper is peeled from the adhesive 119 operatively connected to the bottom side 118 of the mount 111, and the adhesive 119 is applied to a surface such as a dryer fin 141 thereby operatively connecting the mount 111 to the surface. Then, the product carrier 121 carrying product 131 is attached to the mount 111. The attachment member 115 of the mount 111 is configured and arranged to engage the mating member 124 of the product carrier 121. In the preferred embodiment, the attachment member 115 is a flange on each end 116 and 117 of the mount 111 and the mating member 124 is a pair of legs on each side of the product carrier 121 configured and arranged to releasably engage the flanges. The product carrier 121 may be either snapped onto the mount 111 so the legs engage the flanges or the product carrier 121 may be slid onto the mount 111 from

the end of the mount 111. The product 131 is then ready for dispensing. The wedge shape of the mount 111 allows the product 131 to be more evenly dispensed because the product 131 is angled toward the center of the dryer 140 thereby exposing a greater surface area of the product 131 to the laundry contained within the dryer 140.

5 Again, only a small portion of the product 131 is depleted during each use. Therefore, the product carrier 121 carrying the product 131 can be used for several applications. When the product 131 becomes depleted, the empty product carrier 121 can be replaced with a second product carrier carrying product, and the empty product carrier 121 can be thrown away. Again, the product carrier 121 could be  
10 removed if dispensing of the product 131 is not desired.

In another preferred embodiment product dispenser and carrier 210, shown in Figures 11a and 11b, the dispenser 211 includes an attachment member 215, which is a pair of oval shaped holes. The oval shaped holes ensure that the corresponding hole plugs, whether round or square, fit within the holes even if shrinkage of the  
15 holes during casting of the product (approximately up to 300° F) or from the dryer heat (approximately up to 250° F) should occur. The dispenser 211 also includes a front 212, a back 218, and a perimeter 213. The perimeter 213 of the dispenser 211 includes a rail portion 214 extending outward from the front 212 and an indentation 217. The rail portion 214 borders the carrier 221 and protects the edges of the  
20 carrier 221 when operatively connected to the front 212 of the dispenser 211. The indentation 217 provides easy access to a portion of the edges of carrier 221 when detachment from the dispenser 211 is desired. An adhesive, not shown, may be attached to the back 218 of the dispenser 211 for attaching the dispenser 211 to a surface.

25 The carrier 221 includes a first side 222, a second side 223, and a mating member 224. The first side 222 is the side onto which a solid product is cast or extruded, and the solid product extends outward from the first side 222. The first side 222 is dome shaped so that when the solid product is mounted thereto the solid product will take on a dome shape as well. In addition, the dome shape of the first  
30 side 222 creates deeper countersunk portions (not shown) proximate the second side

223 thereby allowing the product to attach more securely to the carrier 221. The dome shape also improves the dispense rate of the product and assists in more even dispensing of the product. Although not shown, the carrier 221 includes a plurality of apertures similar to those shown in Figures 13 and 14. This arrangement of the plurality of apertures allows the product to spread out from the first side 222 toward proximate the second side 223 thereby preventing the solid product from detaching from the carrier 221. The mating member 224 is a pair of square shaped hole plugs with arrow shaped ends and a slit parallel with the edges forming the arrow shaped ends. The mating member 224 corresponds with the holes in the dispenser 211. Because the hole plugs are square rather than round, there is more surface area engaging the holes thereby maximizing the grip. The hole plugs simply snap into the holes to releasably attach the carrier 221 to the dispenser 211.

Figure 12 shows another preferred embodiment of the present invention. Rather than having an attachment member and a mating member that snap into one another, the product dispenser and carrier 310 includes a carrier 321 that slides into a dispenser 311. The carrier 321 itself acts as the mating member in this embodiment. The dispenser 311 has a front 312, a back 318, and a perimeter 313. The back 318 provides a surface on which an adhesive or other securing member may be attached to mount the product dispenser and carrier 310 onto a surface. The perimeter 313 of the dispenser 311 includes a rail portion 314 extending outward from the front 312 along three sides of the dispenser 311. The rail portion 314 borders the carrier 321 along three sides and protects the three edges of the carrier 321 when operatively connected to the front 312 of the dispenser 311. An attachment member includes lips 315a and a securing tab 315b. The lips 315a extend inward from the rail portion 314 to engage the three edges of the carrier 321 thereby preventing the carrier 321 from detaching from the dispenser 311. The securing tab 315b is on the fourth side of the dispenser 311 not having a rail portion. When the carrier 321 is slid into the dispenser 311 from the fourth side, the securing tab 315b is pushed downward and then snaps into place to border the corresponding edge of the carrier 321 when in place on the front 312 of the dispenser 311. Therefore, securing tab 315b provides a

snap fit to hold the carrier 321 onto the dispenser 311. To disengage the carrier 321 from the dispenser 311, the securing tab 315b is pushed downward and then the carrier 321 is slid away from the dispenser 311 from the fourth side.

The second side 323 of the carrier 321 faces the front 312 of the dispenser 311 and the first side 322 of the carrier 321 is the side from which the product extends. Again, the first side 322 is dome shaped so that when the solid product is mounted thereto the solid product will take on a dome shape with rounded top edges as well. Again, this dome shape improves the dispensing rate of the product and assists in more even dispensing of the product. Although not shown, the carrier 321 includes a plurality of apertures similar to those shown in Figures 13 and 14. This arrangement of the plurality of apertures allows the product to spread out from the first side 322 toward proximate the second side 323 thereby preventing the solid product from detaching from the carrier 321.

Figure 13 is another embodiment of the present invention similar to that shown in Figure 12 but rather than sliding into the dispenser 411 from the side, the carrier 421 slides in from an end. The product dispenser and carrier 410 includes a dispenser 411 and a carrier 421. The dispenser 411 has a front 412 and a perimeter 413.

The perimeter 413 of the dispenser 411 includes a rail portion 414 extending outward from the front 412 along three sides of the dispenser 411, leaving an end without a rail portion. The rail portion 414 borders the carrier 421 along three sides and protects the corresponding three edges of the carrier 421 when operatively connected to the front 412 of the dispenser 411. An attachment member includes lips 415a and a securing tab 415b. The lips 415a extend from the rail portion 414 along the two sides, and in the preferred embodiment, there are three lips 415a on each side, the three lips 415a being aligned with the opposing three lips 415a. It is recognized, however, that any arrangement of lips 415a is possible as long as the mating members 424 on the carrier 421 are properly aligned. The securing tab 415b is on the end of the dispenser 411 not having a rail portion. When the carrier 421 is slid into the dispenser 411 from either the end or as described below, the securing

tab 415b is pushed downward and then snaps into place to border the corresponding edge of the carrier 421 when in place on the front 412 of the dispenser 411.

The back (not shown) of the dispenser 411 provides a surface onto which an adhesive, magnet, or other attachment member may be attached to mount the dispenser 411 onto a surface. It is recognized that the attachment member may be attached to the entire back of the dispenser or a portion thereof. Figures 24a and 24b show embodiments having at least one magnet operatively connected to the back of the dispenser. The at least one magnet may be molded into the back in a channel-type setting thereby incorporating the magnet into the back of the dispenser, attached to the back of the dispenser with an adhesive, attached to the back of the dispenser with a fastener such as a screw, a pin, a stud, or a clamp. In Figure 24a, a magnet 419' is incorporated into the back 418' of the dispenser and in Figure 24b, two magnets 419'' are incorporated into the back 418'' of the dispenser. Any number of magnets may be operatively connected to the dispenser as long as the magnet(s) provide a strong enough attraction to the surface to hold the product dispenser and carrier in place during use.

The carrier 421 has a first side 422, a second side 423, and mating members 424. The mating members 424 are lips extending from the side edges of the carrier 421 and are arranged similarly as the lips 415a on the dispenser 411. Therefore, the carrier 421 does not have to be slid into the dispenser 411 all the way from an end of the carrier 421. Rather, the mating members 424 are simply placed in the spaces between the lips 415a thereby depressing the securing tab 415b concurrently. As the carrier 421 is slid into the dispenser 411 so that the lips 415a align with the mating members 424, the securing tab 415b engages the end of the carrier 421 thereby snapping it into place. This provides a shorter distance to connect the carrier 421 to the dispenser 411 should the walls of the dryer prevent the carrier 421 from being slid into place from the end of the dispenser 411. To disengage the carrier 421 from the dispenser 411, the securing tab 415b is pushed downward and then the carrier 421 is slid away from the lips 415a of the dispenser 411. When the mating members



424 of the carrier 421 no longer align with the lips 415a of the dispenser 411, the carrier 421 may be removed from the dispenser 411.

The carrier 421 also includes a plurality of apertures 425 and tapered portions 426. The tapered portions 426 taper outward from the first side 422 to the second side 423 of the carrier 421, and the tapered apertures 425 have a smaller diameter on the first side 422 and a larger diameter on the second side 423. The preferred embodiment apertures 425 are hexagonal shaped, and each of the six sides is tapered. In the preferred embodiment, the tapered portions 426 are angled more than 0° and less than 10° from a tangent line generally perpendicular to the first side 422 of the carrier 421. More preferably, the tapered portions 426 are tapered approximately 1° to 3° from a tangent line generally perpendicular to the first side 422 of the carrier 421. Figure 23 shows a cross sectional view of an aperture 425 in the carrier 421 taken along the lines 23-23 in Figure 13. The apertures 425 have tapered portions 426 with angles A. Similar to the countersunk portions described above, angles A provide means to secure the solid product onto the carrier 421 because the solid product slightly fans out proximate the second side 423 thereby securing the solid product onto the carrier 421.

In any of the embodiments, either tapered portions or countersunk portions may be used as they have the same function. The tapered portions begin at the top of the carrier and taper outward toward the bottom of the carrier. In the countersunk portions, the taper begins approximate the middle of the carrier and taper outward toward the bottom of the carrier. Regardless where the taper begins, the taper allows the solid product to fan out proximate the bottom of the carrier thereby securing the solid product onto the carrier.

Figure 14 is a bottom perspective view of the carrier 421 shown in Figure 13. For illustrative purposes, product 431 is only shown on half of the carrier 421 to show both the bottom structure of the carrier 421 and how the product 431 is supported below the carrier 421. As shown in Figure 14, the carrier 421 includes a straight reinforcement rib member 430a along the center parallel to the sides of the carrier 421 and a zig-zag reinforcement rib member 430b on each side of the straight

reinforcement rib 430a approximately half-way to the sides of the carrier 421. The zig-zag reinforcement members 430b do not interfere with the nonlinear arrangement of the apertures 425 and therefore do not block the apertures 425. The zig-zag reinforcement members 430b may or may not be tapered or countersunk to hold the product in a similar way as the apertures 425 of the carrier 421. There is a major portion of the product 431 on the top of the carrier 421 to be dispensed during the dryer cycle. There is a minor portion of the product 431 inside the carrier 421 and extending into the tapered portions 426 and in between the ribs 430a and 430b of the carrier 421, as shown in Figure 14. Therefore, the major portion of the product is joined on top of the carrier 421 and the minor portion of the product is joined below the carrier 421 between the ribs 430a and 430b. This assists in keeping the product on the carrier 421.

Optionally, the carrier 421 may also include a cover (not shown) attached to the second side 423 and creating a gap between the second side 423 and the cover where the product joins below the carrier 421. With a cover, the product 431 would contact the cover between the ribs 430a and 430b. This assists in casting the product vertically onto the carrier 421 and the product is more evenly applied to the carrier 421. When casting the product onto the carrier 421 horizontally, the cover is not needed for even application of the product. Also, the cover protects the solid product that has gone through the apertures and tapered portions so the only part of the product that is exposed is the portion extending from the first side 422 of the carrier 421. Therefore, the product can extend past the tapered portions 426 and reconnect/join along the surface of the cover to provide additional assurance that the product will not separate from the carrier 421. The line 15-15 in Figure 14 shows the line across which the cross sectional view of Figure 15 is taken. Figure 15 is a cross sectional view showing a solid product 431 on the carrier 421 shown in Figures 13 and 14. Although Figure 14 shows product 431 on only half of the carrier 421, Figure 15 shows product on the entire carrier 421. This further shows how the product 431 connects both above and below the carrier 421 for added security of the product 431 on the carrier 421.

In addition, the product could also be mounted, cast, or otherwise attached by means well known in the art onto VELCRO®, 3M™ Scotchmate™, 3M™ Dual Lock™, or any other suitable hook and loop or reclosable fastener type device. Figure 22 shows a preferred embodiment product dispenser and carrier 510 utilizing hook and loop. The product dispenser and carrier 510 includes a dispenser or plate member 511 and a carrier 521. The dispenser 511 is a piece of loop having a front 512 with an attachment member 515 and a back 518 with an adhesive or connecting member 519. The adhesive 519 operatively connects the dispenser 511 onto a surface such as a dryer fin 541. The carrier 521 includes a first side or layer 522 and a second side or layer 523. The first and second sides 522 and 523 are each pieces of hook, and the adhesives attached to the back of each piece (not shown) are pressed together so that the hook portions are opposing. The first side 522 has hook 525 and the second side 523 has hook or mating member 524. The product 531 is attached to the hook 525 while the mating member 524 engages the attachment member 515. Therefore, the carrier 521 readily attaches to and detaches from the dispenser 511 as easily as the interaction between the hook 524 and the loop 515. When the product 531 has become depleted, the carrier 521 is simply detached from the dispenser 511 by disengaging the hook 524 and the loop 515 and then another carrier carrying product is substituted therefor.

Another embodiment of the present invention incorporates the dispenser or plate member 611 of the product dispenser and carrier 610 into an inner surface of the dryer 40. The plate member may be molded as part of the inner surface of the dryer 40 or fixedly attached thereto by means well known in the art. Figure 25 shows the dispenser 611 incorporated into the fin 41' of the dryer 40. However, the inner surface of the dryer could be a fin, a door, a wall opposite the door, and a drum wall of the dryer; and there are many possible locations and orientations of the plate member on these surfaces.

As shown in Figure 26, the dispenser 611 of the product dispenser and carrier 610 includes a front side 612 and a perimeter 613. The perimeter 613 of the dispenser 611 includes a rail portion 614 extending outward from the front 612

along three sides of the dispenser 611, leaving an end without a rail portion. Alternatively, rather than having a rail portion, one end could include a stop member and the opposite end could receive the product carrier (not shown). Similar to the product dispenser and carrier 410 shown in Figure 13, the rail portion 614 borders the product carrier along three sides and protects the corresponding three edges of the product carrier when operatively connected to the front 612 of the dispenser 611. An attachment member includes lips 615a and a securing tab 615b. The lips 615a extend from the rail portion 614 along the two sides, and in the preferred embodiment, there are three lips 615a on each side, the three lips 615a being aligned with the opposing three lips 615a. It is recognized, however, that any arrangement of lips 615a is possible as long as the mating members on the carrier (not shown) are properly aligned. The securing tab 615b is on the end of the dispenser 611 not having a rail portion. When the carrier is slid into the dispenser 611 from either the end or as described above with regard to the product dispenser and carrier 410, the securing tab 615b is pushed downward and then snaps into place to border the corresponding edge of the carrier when in place on the front 612 of the dispenser 611.

Although only one embodiment of the present invention is shown incorporated into the dryer fin 41', it is recognized that any of the embodiments shown and described could be similarly incorporated or even fixedly attached thereto. In addition, attachment members could simply be incorporated into the inner surface of the dryer to receive and secure the product carrier onto the inner surface.

It was found that the shape of the product affects the dispensing rate of the product. The dispense curves of the product dose per dryer cycle as a function of the number of dryer cycles were compared for four different sizes and shapes of solid product. Each solid product was 8 inches long. The dispenser and carriers were mounted in the center on the front portion of the fin of a 75 pound dryer. The front portion of the fin is the portion that touches the laundry. The first product having a half-cylindrical narrow shape (1.75 inches wide) and a high dome (1.00 inch high) is

shown in Figures 16a and 16b. Figure 16a is a side view of the product and Figure 16b is an end view of the product shown in Figure 16a. The second product having a half-cylindrical narrow shape (1.75 inches wide) and a high dome (1.00 inch high) with rounded top edges is shown in Figures 17a and 17b. Figure 17a is a side view of the product and Figure 17b is an end view of the product shown in Figure 17a. The third product having a half-cylindrical wide shape (2.50 inches wide) and a low dome (0.65 inch high) is shown in Figures 18a and 18b. Figure 18a is a side view of the product and Figure 18b is an end view of the product shown in Figure 18a. The fourth product having a half-cylindrical wide shape (2.50 inches wide) and a low dome (0.65 inch high) with rounded top edges is shown in Figures 19a and 19b. Figure 19a is a side view of the product and Figure 19b is an end view of the product shown in Figure 19a.

The wide, low dome products (third and fourth products) shown in Figure 21 dispensed the product more slowly than the narrow, high dome products (first and second products) shown in Figure 20. The initial doses were approximately 9 grams and 3.5 grams per dryer cycle (third and fourth products, respectively) versus approximately 13 grams and 5 grams per dryer cycle (first and second products, respectively). The products with the rounded top edges (second and fourth products) dispensed the product more evenly from the first to the last cycle as compared to the products with squared/sharp edges (first and third products). In other words, the high initial doses observed with squared/sharp edges (first and third products) were avoided by rounding the edges (second and fourth products). These high initial doses are most likely due to the wet laundry sliding over the square/sharp edges at both ends of the half-cylindrical product thereby slowly wearing the edges until a rounded edge is formed. The optimum shape for even dispensing of the product was obtained by using a half-cylindrical block of product with squared/sharp edges that were rounded after approximately 20 dryer cycles. Therefore, starting with a shape having rounded edges or rounded surfaces, which results from using a block of product with squared/sharp edges that were rounded after approximately 20 dryer cycles, provides an optimum shape for dispensing a consistent, optimum dose of

product. The optimum shape helped reduce high product doses in the initial doses. As shown in Figures 20 and 21, the most even dispensing was achieved with the wide product block with rounded edges (fourth product).

Figure 20 is a graph showing the dispensing rates of the solid products shown in Figures 16a and 17a, and Figure 21 is a graph showing the dispensing rates of the solid products shown in Figures 18a and 19a. These graphs show that products having rounded edges have more even dispense curves from the first dose to the final dose. The products having the sharp edges begin with much higher initial doses than products having rounded edges. Therefore, to ensure that a consistent, optimum dose is achieved for each cycle, a product with rounded edges should be used.

The amount of product dispensed is also moisture controlled. In other words, every time the wet or damp laundry tumbling around in the dryer contacts the product, minute amounts of the product are dissolved by the adsorbed water in the laundry. This is due to the low water solubility of the product and also due to the friction (mechanical action) of the laundry rubbing against the product. Once the laundry is dry, product will no longer be dispensed. In the preferred embodiment, the product is sized to deliver doses for multiple cycles (100+). Ideally, the dose should not change significantly from the first to the last dryer cycle. For example, if a dose of 1 gram per cycle provides the desired effect on the laundry, a block of 100 grams should last for 100 cycles, dispensing approximately 1 gram per cycle. Generally, the product will last for multiple cycles (100+) in a dryer and dispense approximately the same dose of product from the first to the last cycle.

However, experiments have shown that dispense curves are not even from the first to the last cycle because of the changes in volume, surface area, and shape of the product over time. The changes in the volume and the surface area, which inevitably decrease with each dose, cause the dispensed dose to decrease slowly from the first to the last cycle because there is less contact with the laundry and the product. The shape of the product is also a factor for the initial doses of the product. If the product is cast in the shape of a rectangular block, the contact between the

tumbling laundry and the block will cause the sharp edges of the block to become smooth or round by friction during the initial cycles. This causes substantially higher dispense doses in the initial dryer cycles until the edges are smooth or round and the block resembles a half-cylinder with round ends (oval in shape).

5           In addition, the amount of product that is dispensed can also be affected by the location, the position, and the orientation of the product in the dryer. The product can be placed on either side of the fin or even on the door of the dryer. In addition, it was found that placement of the dispenser and carrier on the fin also affects the dispensing rate of the product. In other words, placing the dispenser and  
10   carrier on the side of the fin that touches the laundry would increase the dispensing rate of the product. Conversely, placing the dispenser and carrier on the side opposite the side of the fin that touches the laundry would decrease the dispensing rate of the product. Position on the fin such as in the center of the fin or near the edge of the fin will also affect the dose. In addition, if the product is mounted at an  
15   angle relative to the surface of the fin, as shown in Figure 9, more product is exposed to the laundry thereby dispensing more product. Although any of these placements is acceptable, it is preferred to place the dispenser and carrier on the back side of the fin (the following edge) to dispense less product, which provides better results.

20           It is understood that any of these features may be interchanged among the different preferred embodiments to create variations thereof and such variations are within the scope of the present invention. It is also understood that the plate member and the product carrier may be made in numerous different shapes and sizes and are not limited to being rectangular or oval in shape, as shown in the preferred  
25   embodiments. Further, it is recognized that the dimensions described herein are for illustrative purposes only and any dimensions suitable for the intended purpose are acceptable. In addition, it is also understood that the product dispenser and carrier may be used on the inner surface of a dryer or it may even be used in different applications such as pest elimination and dish washing to dispense products such as  
30   insect bait and drying agents, respectively. Also, the types of products that could be

used with this device are softeners, sanitizers, water repellants, deodorizers, bleaches, soil repellants, dye-transfer inhibitors, fiber protecting polymers, fiber smoothers, UV light absorbers, anti-wrinkle agents, etc. Any of these products, as well as additional products, could be used with the present invention.

5       The above specification, examples and data provide a complete description of the manufacture and use of the composition of the invention. Since many embodiments of the invention can be made without departing from the spirit and scope of the invention, the invention resides in the claims hereinafter appended.



We Claim:

1. A dispenser for attachment to a surface, comprising:
  - a) a plate member having a front side, a back side, and an attachment member;
  - 5 b) a product carrier having a first side, a second side, and a mating member, said mating member being configured and arranged to engage said attachment member thereby releasably connecting said plate member and said product carrier, whereby said product carrier is replaceable; and
  - c) a solid product operatively connected to said product carrier, said  
10 solid product extending from said first side of said product carrier away from said plate member and said second side of said product carrier facing said front side of said plate member.
2. The dispenser of claim 1, further comprising a connecting member operatively connected to said back side of said plate member, said connecting  
15 member operatively connecting said plate member to the surface.
3. The dispenser of claim 2, wherein said connecting member is a magnet.
4. The dispenser of claim 2, wherein said connecting member is an adhesive.
5. The dispenser of claim 1, wherein said first side of said product carrier is dome-like shaped.
- 20 6. The dispenser of claim 1, wherein said solid product has rounded top edges thereby having a dome-like shape.
7. The dispenser of claim 1, further comprising a plurality of apertures in said product carrier, wherein said plurality of apertures allow said solid product to be fixed onto said product carrier.
- 25 8. The dispenser of claim 7, wherein said plurality of apertures are countersunk on said second side of said product carrier.
9. The dispenser of claim 7, wherein said plurality of apertures are tapered outward from said first side to said second side of said product carrier.
10. The dispenser of claim 7, wherein said plurality of apertures are disposed on  
30 said product carrier in a nonlinear arrangement.

11. The dispenser of claim 10, further comprising a length of said product carrier and a reinforcement member, said reinforcement member extending along the length of said product carrier in a nonlinear arrangement without interfering with said plurality of apertures.
- 5 12. The dispenser of claim 7, wherein said plurality of apertures are hexagon shaped.
13. The dispenser of claim 1, further comprising dove tail shaped grooves disposed along said product carrier.
14. The dispenser of claim 1, wherein said attachment member is a hole plug and  
10 said mating member is a hole configured and arranged to releasably engage said hole plug.
15. The dispenser of claim 1, wherein said attachment member is a hole and said mating member is a hole plug configured and arranged to releasably engage said hole.
- 15 16. The dispenser of claim 1, wherein said attachment member is lips and a securing tab and said mating member is said product carrier, said product carrier being engaged by said lips and said securing tab to secure said product carrier thereto.
17. The dispenser of claim 1, wherein said attachment member is first lips and a  
20 securing tab and said mating member is second lips.
18. The dispenser of claim 1, wherein said attachment member is a flange and said mating member is legs, said legs engaging said flange to releasably secure said product carrier to said plate member.
19. The dispenser of claim 1, wherein said attachment member is loop and said  
25 mating member is hook.
20. The dispenser of claim 1, wherein said solid product is supported at an angle relative to the surface.
21. The dispenser of claim 20, wherein said plate member is wedge shaped thereby supporting said product carrier at an angle relative to the surface.

22. The dispenser of claim 20, wherein said product carrier is wedge shaped thereby supporting said solid product at an angle relative to the surface.
23. The dispenser of claim 1, wherein said plate member is incorporated into the surface.
- 5 24. The dispenser of claim 23, wherein the surface is a dryer.
25. A method for dispensing a product, comprising:
- a) attaching a plate member to a surface, said plate member having a front side, a back side, and an attachment member, said back side including a connecting member, said connecting member operatively connecting said back side
  - 10 to the surface; and
  - b) attaching a carrier to said plate member, said carrier having a mating member, a first side, and a second side, said mating member being configured and arranged to releasably engage said attachment member, said carrier carrying the product and being replaceable.
- 15 26. The method of claim 25, further comprising allowing the product to become depleted after repeated use.
27. The method of claim 26, further comprising removing said carrier from said plate member.
28. The method of claim 27, further comprising attaching a second carrier to said
- 20 plate member, wherein said second carrier carries a second product.
29. A method of dispensing a fabric conditioner in a dryer, comprising:
- a) operatively connecting a fabric conditioner to a product carrier, said fabric conditioner having rounded edges;
  - b) attaching said product carrier to an inner surface of the dryer;
  - 25 c) allowing said dryer to run through a dryer cycle; and
  - d) dispensing a consistent, optimum dose of said fabric conditioner from an initial cycle to a final cycle until said fabric conditioner has become depleted.

## AMENDED CLAIMS

[received by the International Bureau on 08 August 2003 (08.08.03);  
original claim 29 cancelled; remaining claims unchanged (3 pages)]

We Claim:

1. A dispenser for attachment to a surface, comprising:
  - a) a plate member having a front side, a back side, and an attachment member;
  - 5 b) a product carrier having a first side, a second side, and a mating member, said mating member being configured and arranged to engage said attachment member thereby releasably connecting said plate member and said product carrier, whereby said product carrier is replaceable; and
  - c) a solid product operatively connected to said product carrier, said  
10 solid product extending from said first side of said product carrier away from said plate member and said second side of said product carrier facing said front side of said plate member.
2. The dispenser of claim 1, further comprising a connecting member operatively connected to said back side of said plate member, said connecting  
15 member operatively connecting said plate member to the surface.
3. The dispenser of claim 2, wherein said connecting member is a magnet.
4. The dispenser of claim 2, wherein said connecting member is an adhesive.
5. The dispenser of claim 1, wherein said first side of said product carrier is dome-like shaped.
- 20 6. The dispenser of claim 1, wherein said solid product has rounded top edges thereby having a dome-like shape.
7. The dispenser of claim 1, further comprising a plurality of apertures in said product carrier, wherein said plurality of apertures allow said solid product to be fixed onto said product carrier.
- 25 8. The dispenser of claim 7, wherein said plurality of apertures are countersunk on said second side of said product carrier.
9. The dispenser of claim 7, wherein said plurality of apertures are tapered outward from said first side to said second side of said product carrier.
10. The dispenser of claim 7, wherein said plurality of apertures are disposed on  
30 said product carrier in a nonlinear arrangement.
11. The dispenser of claim 10, further comprising a length of said product carrier and a reinforcement member, said reinforcement member extending along the length

of said product carrier in a nonlinear arrangement without interfering with said plurality of apertures.

12. The dispenser of claim 7, wherein said plurality of apertures are hexagon shaped.

5 13. The dispenser of claim 1, further comprising dove tail shaped grooves disposed along said product carrier.

14. The dispenser of claim 1, wherein said attachment member is a hole plug and said mating member is a hole configured and arranged to releasably engage said hole plug.

10 15. The dispenser of claim 1, wherein said attachment member is a hole and said mating member is a hole plug configured and arranged to releasably engage said hole.

16. The dispenser of claim 1, wherein said attachment member is lips and a securing tab and said mating member is said product carrier, said product carrier  
15 being engaged by said lips and said securing tab to secure said product carrier thereto.

17. The dispenser of claim 1, wherein said attachment member is first lips and a securing tab and said mating member is second lips.

18. The dispenser of claim 1, wherein said attachment member is a flange and  
20 said mating member is legs, said legs engaging said flange to releasably secure said product carrier to said plate member.

19. The dispenser of claim 1, wherein said attachment member is loop and said mating member is hook.

20. The dispenser of claim 1, wherein said solid product is supported at an angle  
25 relative to the surface.

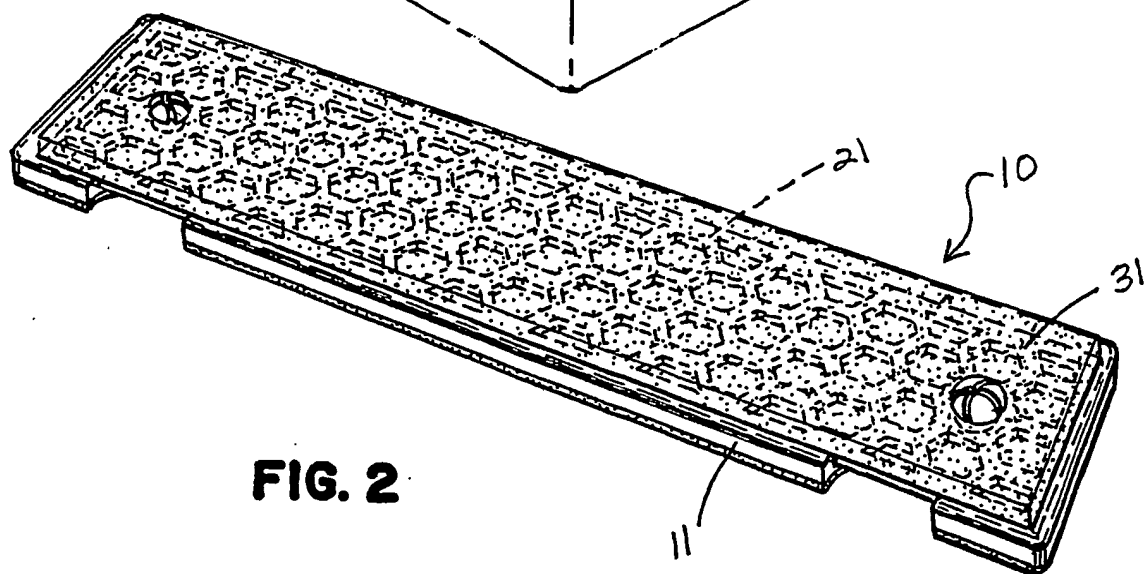
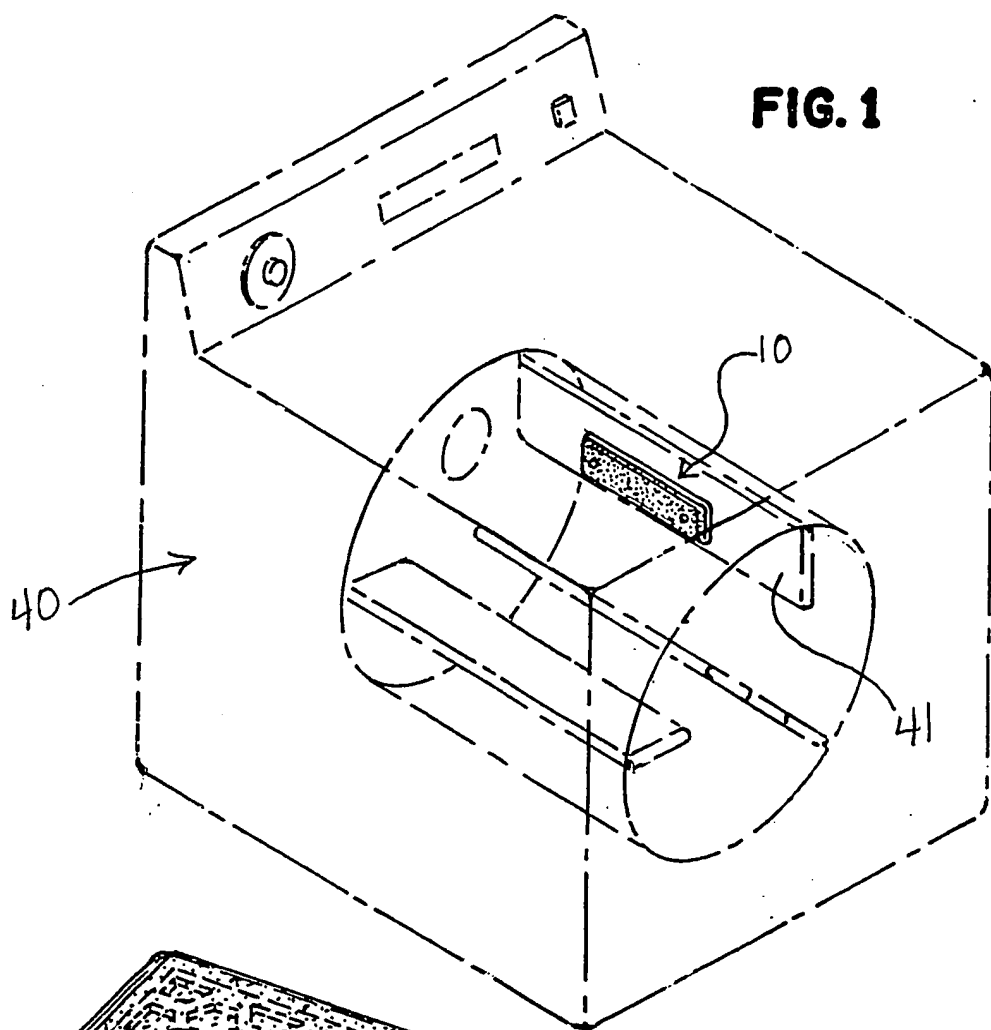
21. The dispenser of claim 20, wherein said plate member is wedge shaped thereby supporting said product carrier at an angle relative to the surface.

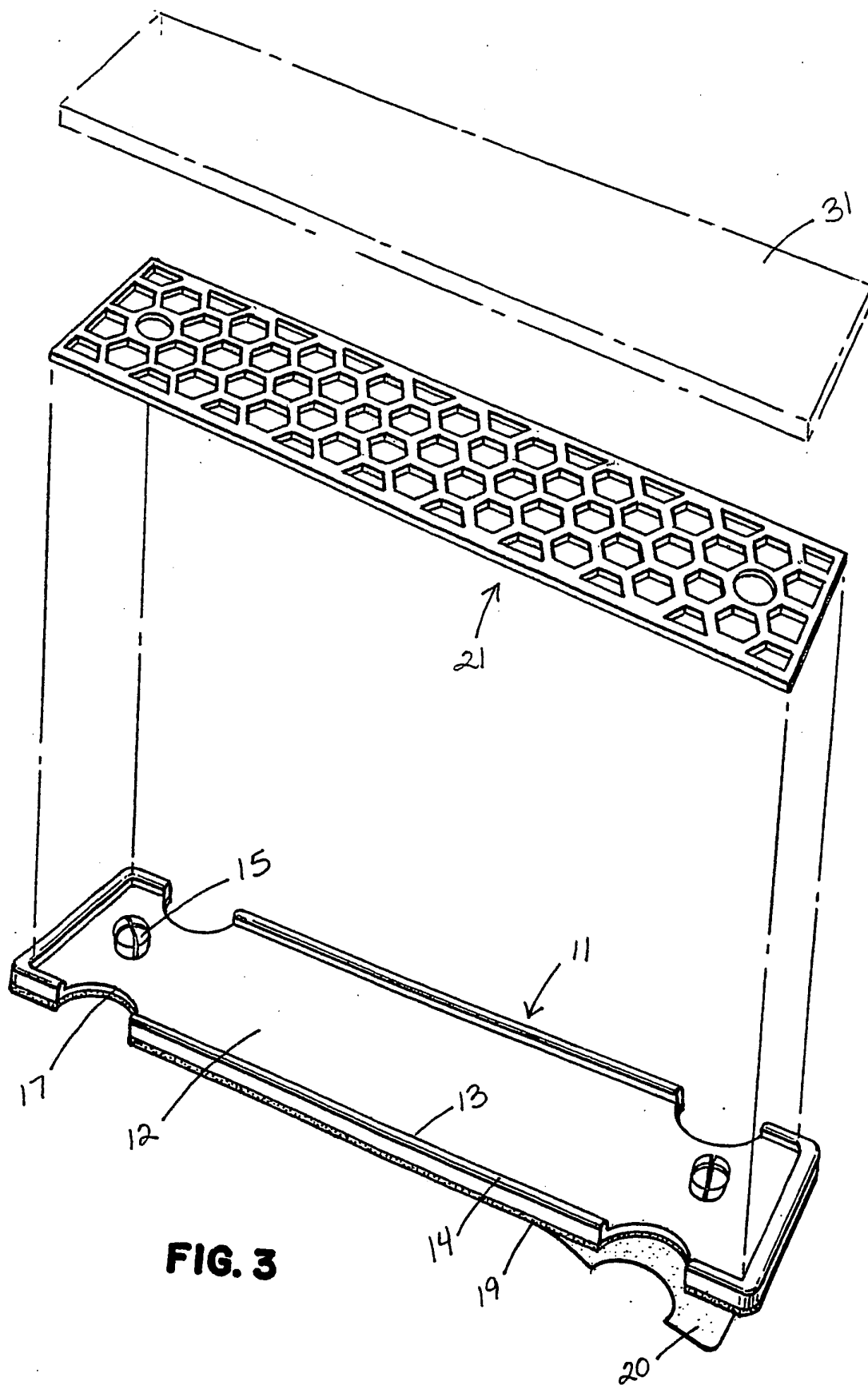
22. The dispenser of claim 20, wherein said product carrier is wedge shaped thereby supporting said solid product at an angle relative to the surface.

30 23. The dispenser of claim 1, wherein said plate member is incorporated into the surface.

24. The dispenser of claim 23, wherein the surface is a dryer.

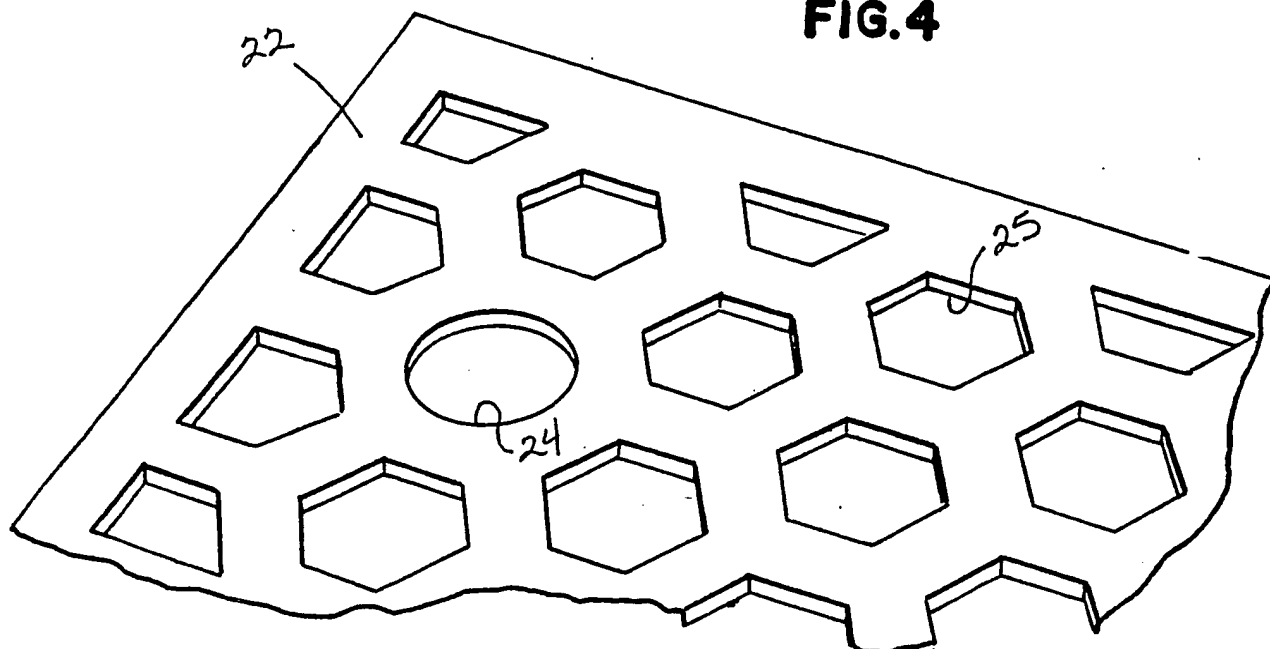
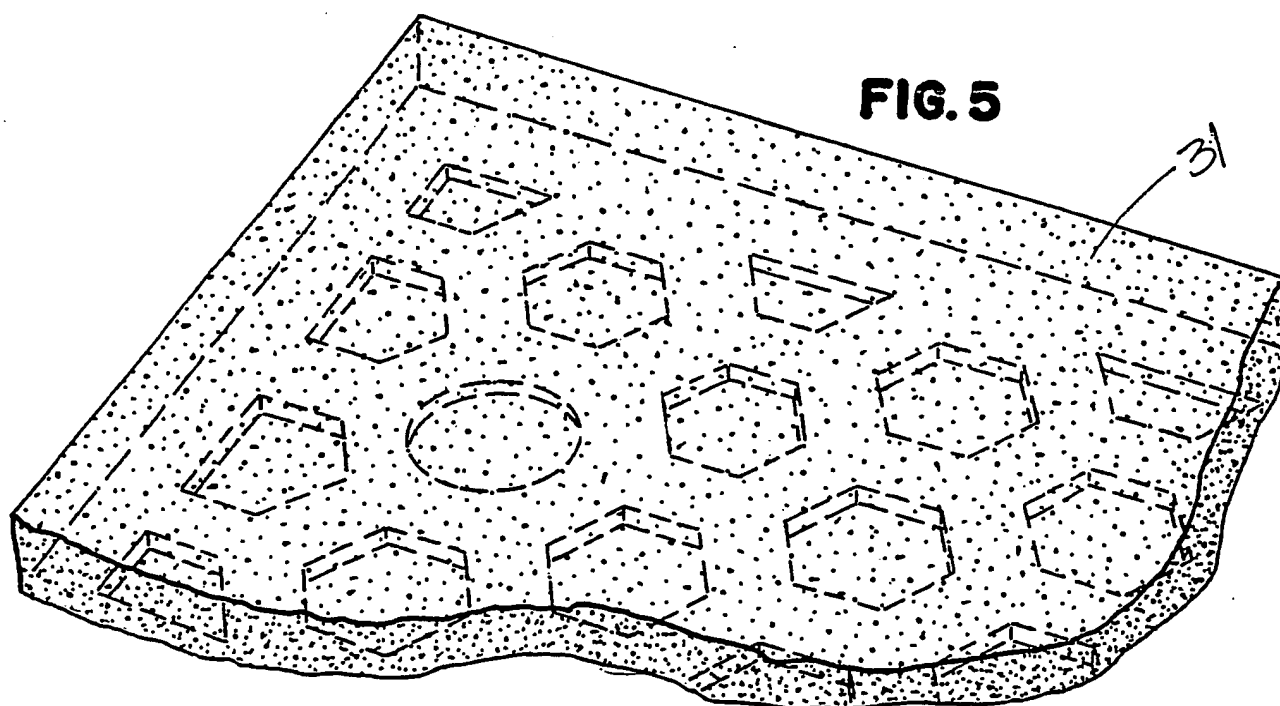
25. A method for dispensing a product, comprising:
- a) attaching a plate member to a surface, said plate member having a front side, a back side, and an attachment member, said back side including a connecting member, said connecting member operatively connecting said back side to the surface; and
  - b) attaching a carrier to said plate member, said carrier having a mating member, a first side, and a second side, said mating member being configured and arranged to releasably engage said attachment member, said carrier carrying the product and being replaceable.
26. The method of claim 25, further comprising allowing the product to become depleted after repeated use.
27. The method of claim 26, further comprising removing said carrier from said plate member.
28. The method of claim 27, further comprising attaching a second carrier to said plate member, wherein said second carrier carries a second product.

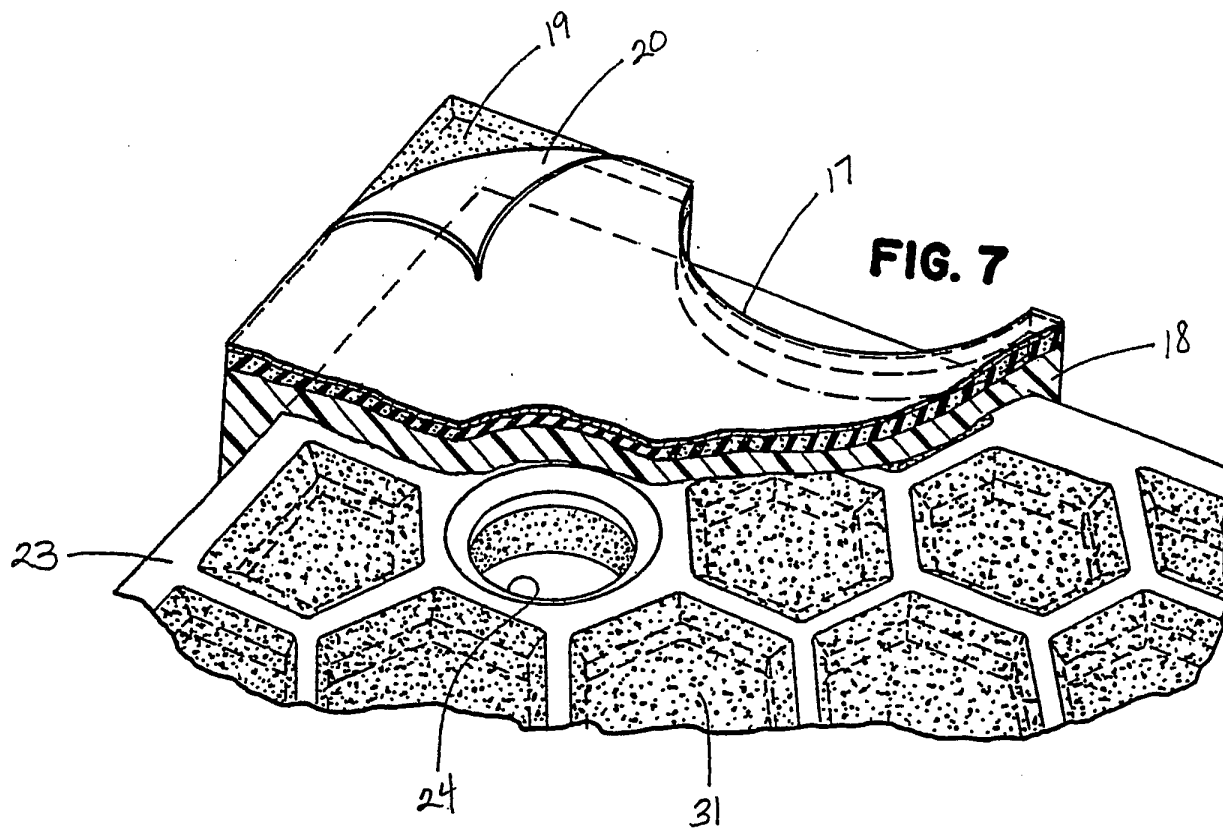
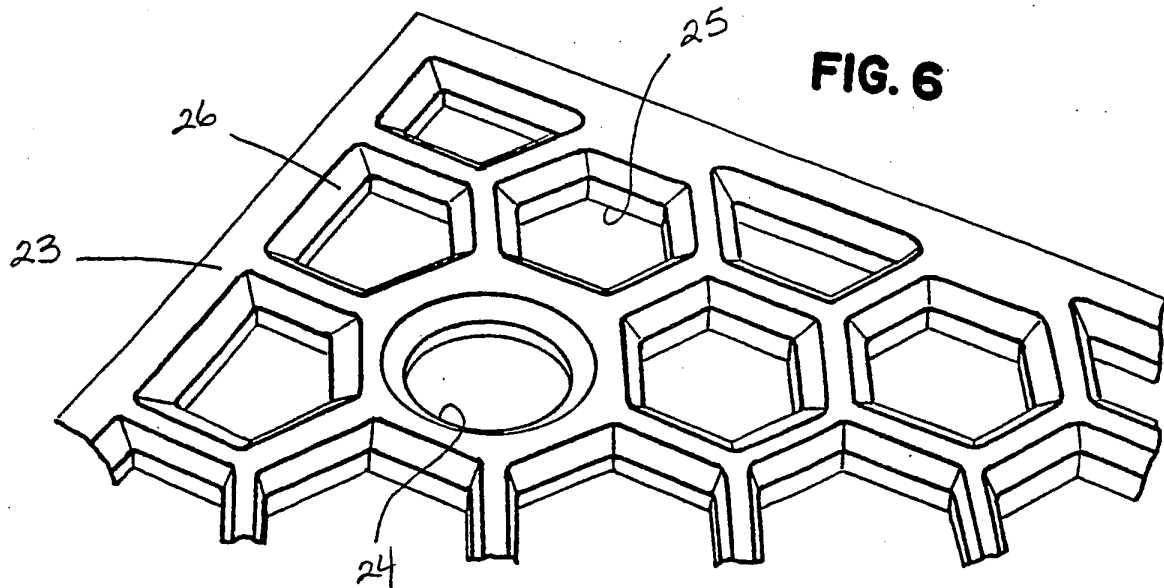
**FIG. 1****FIG. 2**



**FIG. 3**

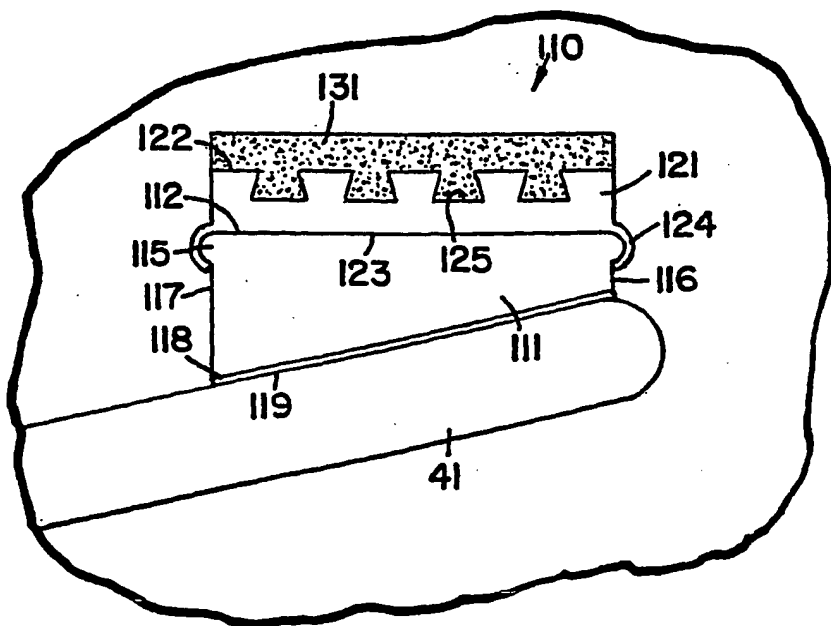
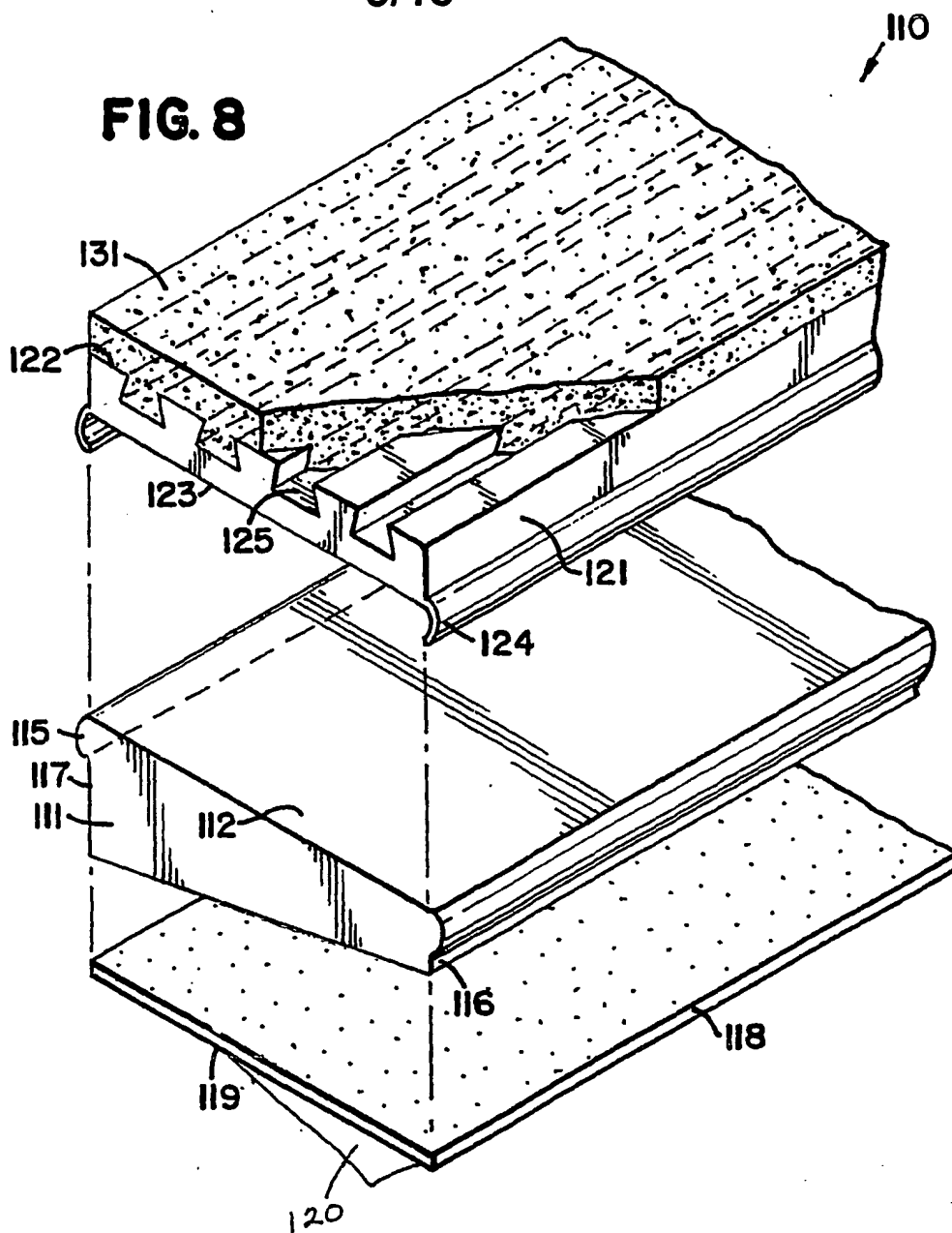


**FIG. 4****FIG. 5**



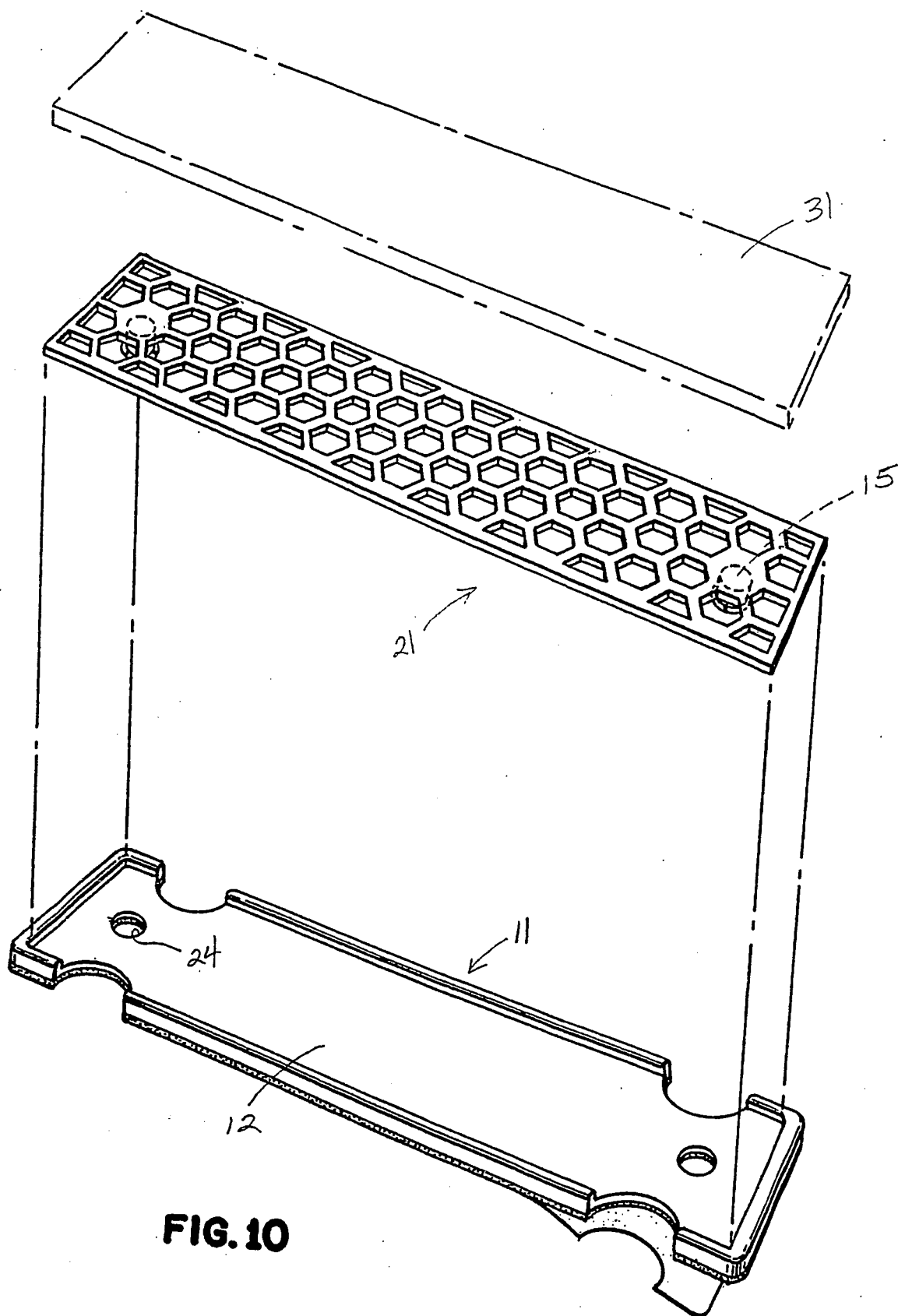
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**FIG. 8**



**FIG. 9**

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**FIG. 10**

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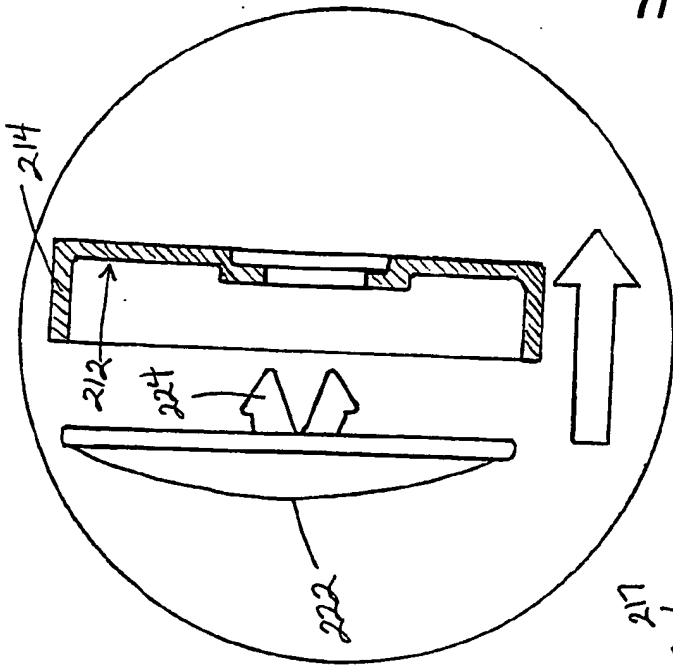


Fig. 11b

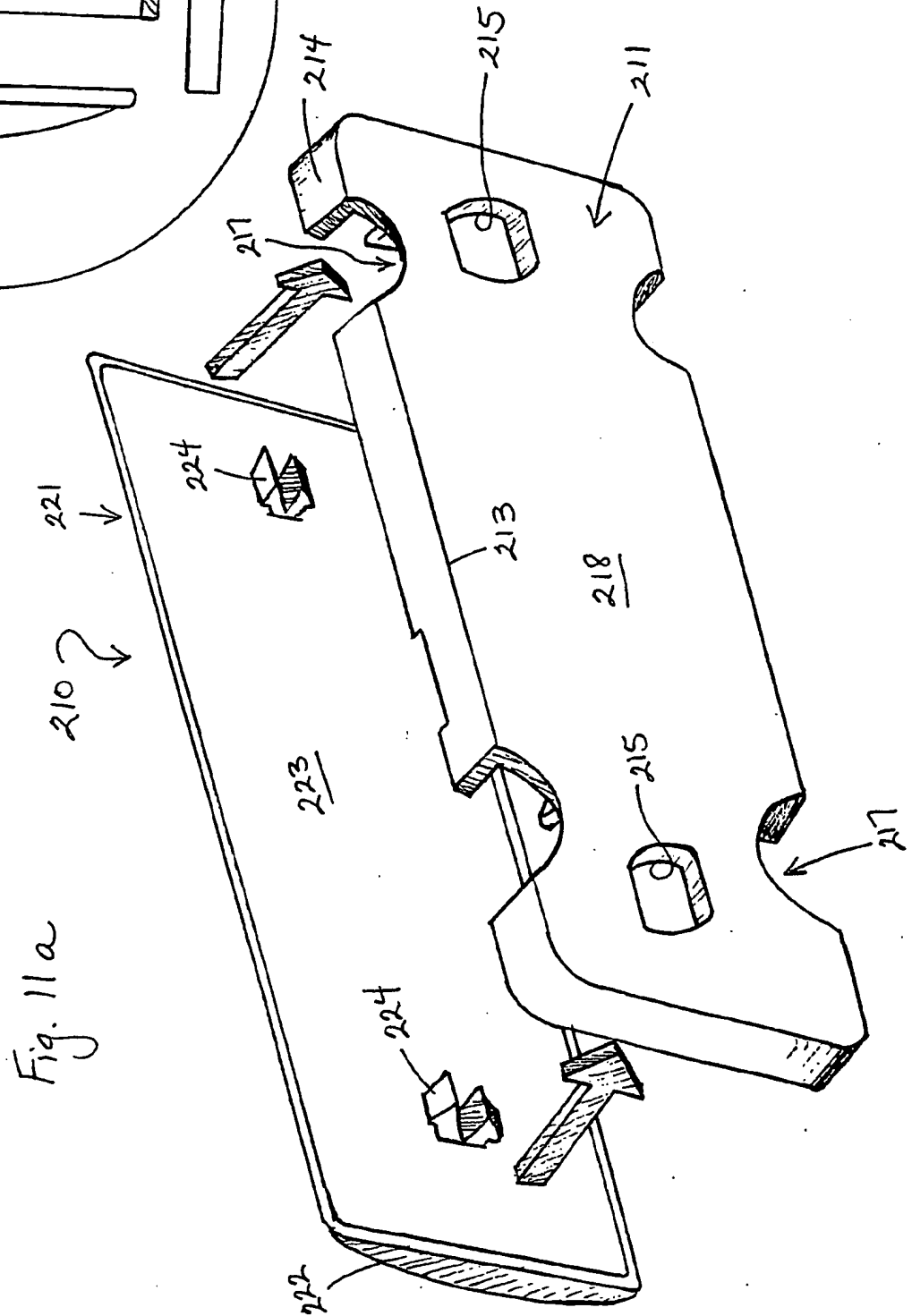


Fig. 11a

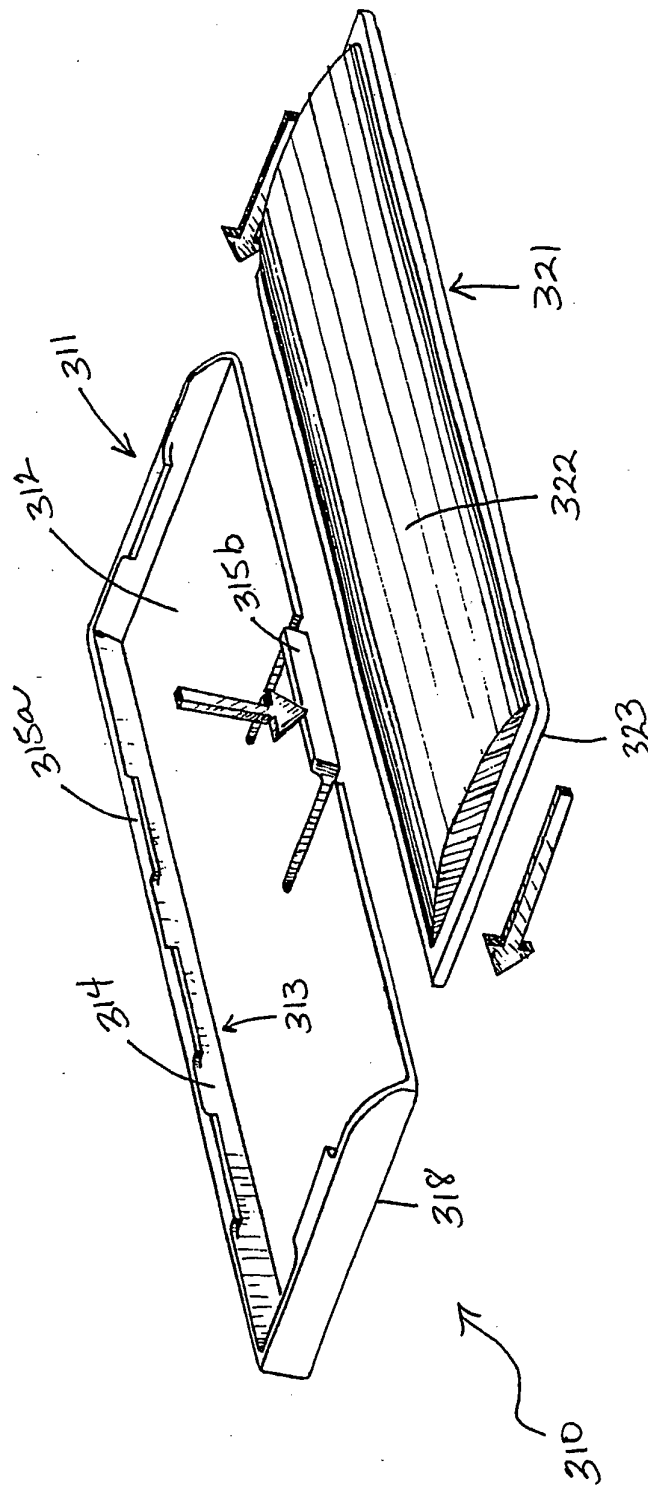
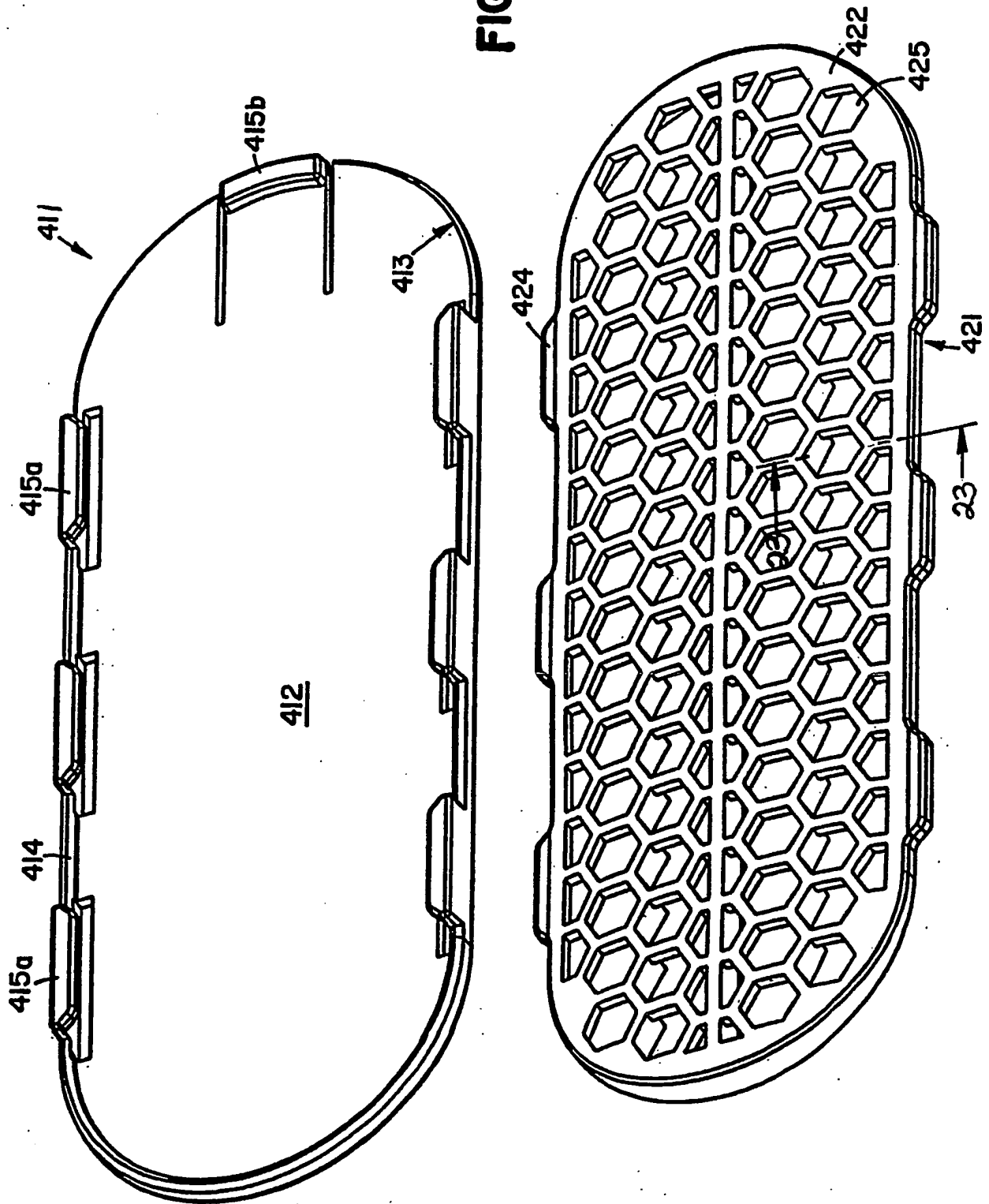


Fig. 12

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**FIG. 13**



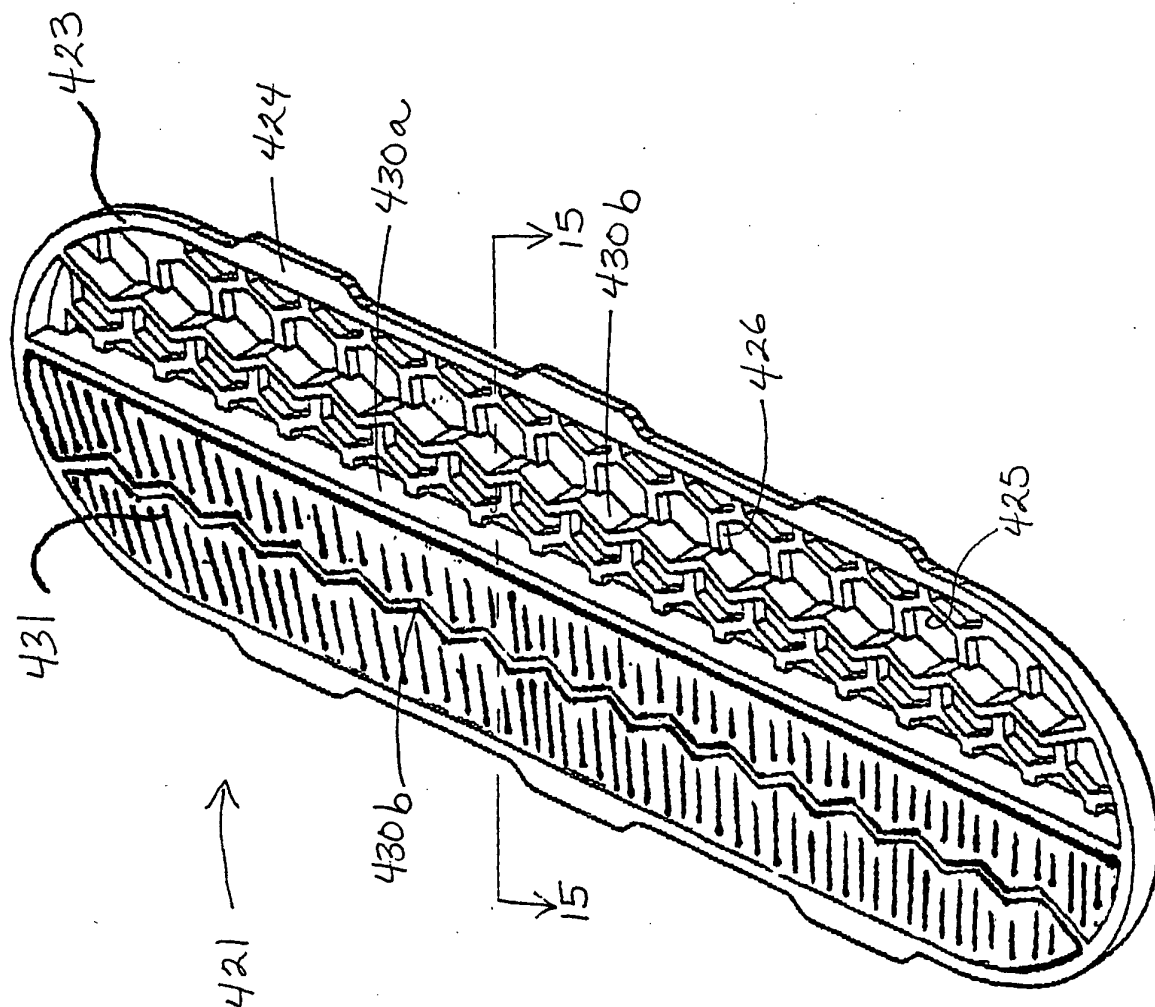


Fig. 14



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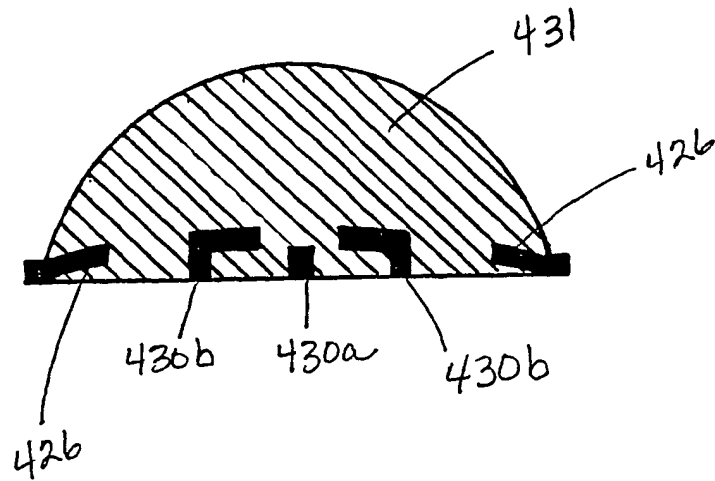


Fig. 15

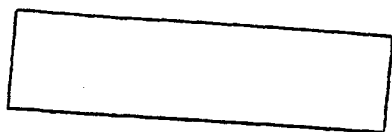


Fig. 16a



Fig. 16b

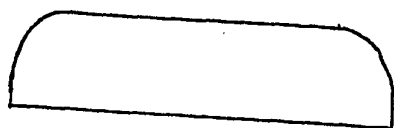


Fig. 17a



Fig. 17b

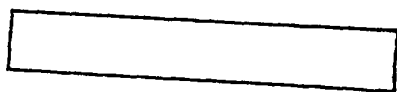


Fig. 18a



Fig. 18b

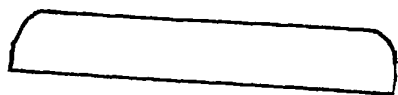


Fig. 19a



Fig. 19b

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Fig. 20  
Dispensing of Narrow (1.75") Blocks

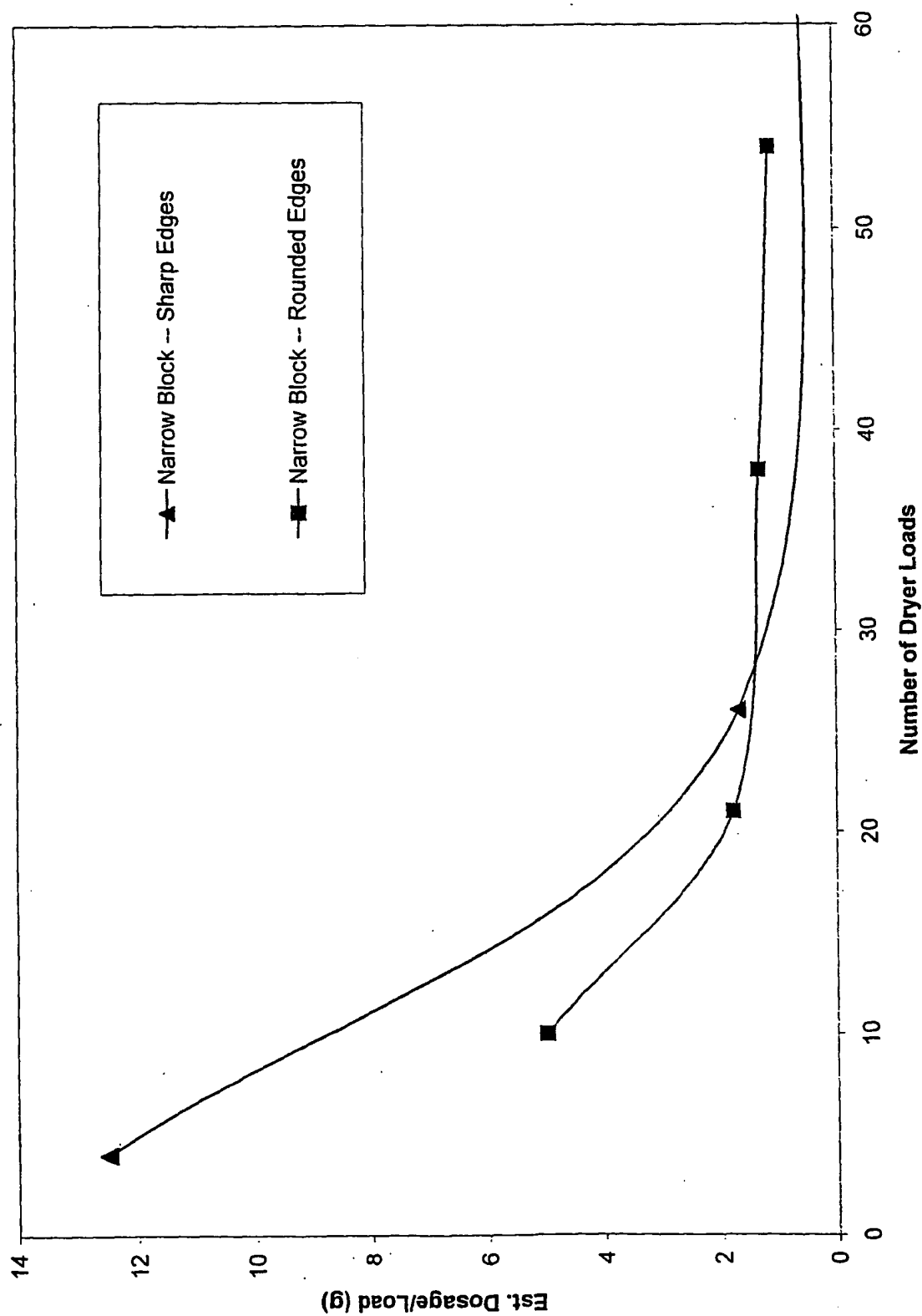
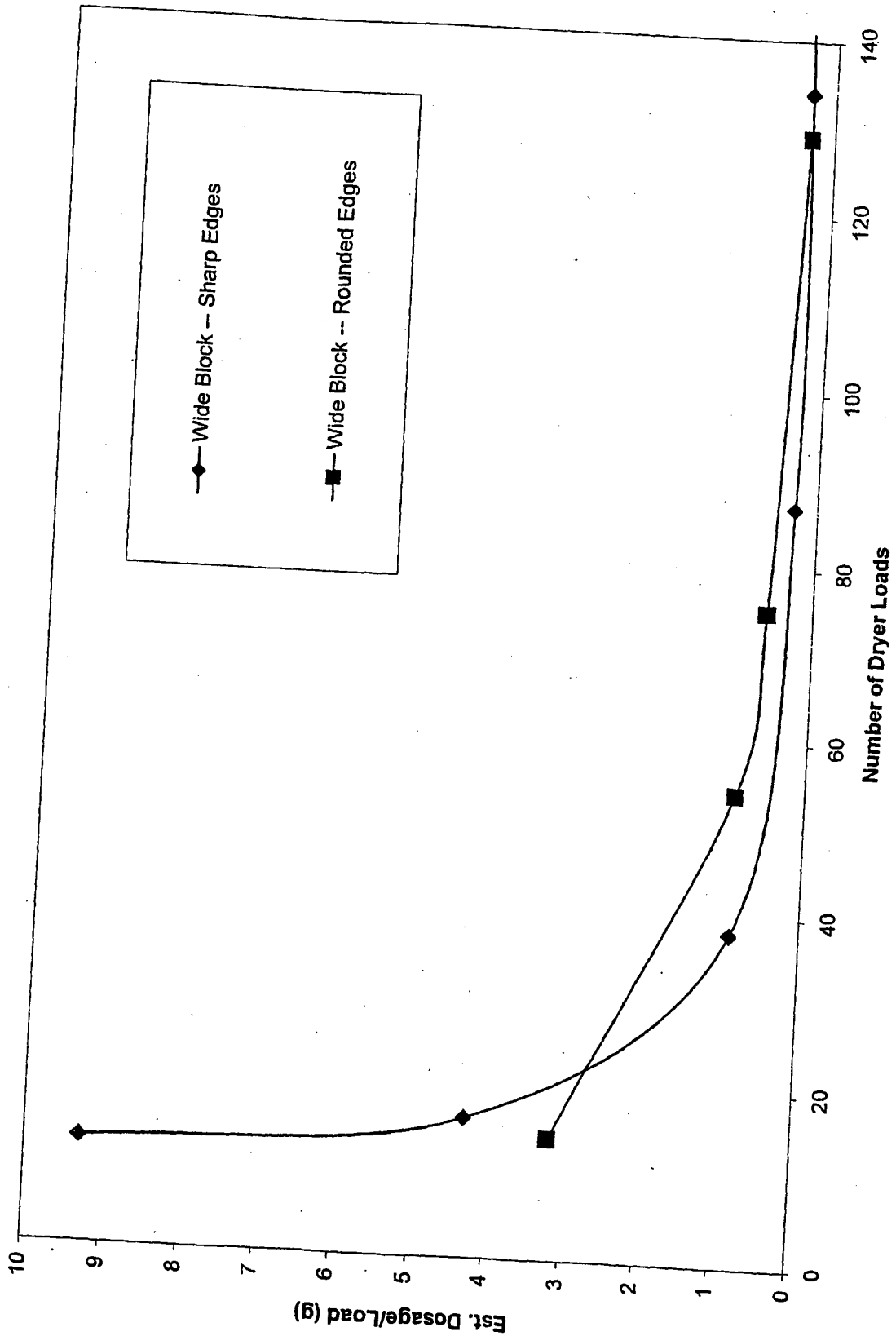


Fig. 21  
Dispensing of Wide (2.5") Blocks



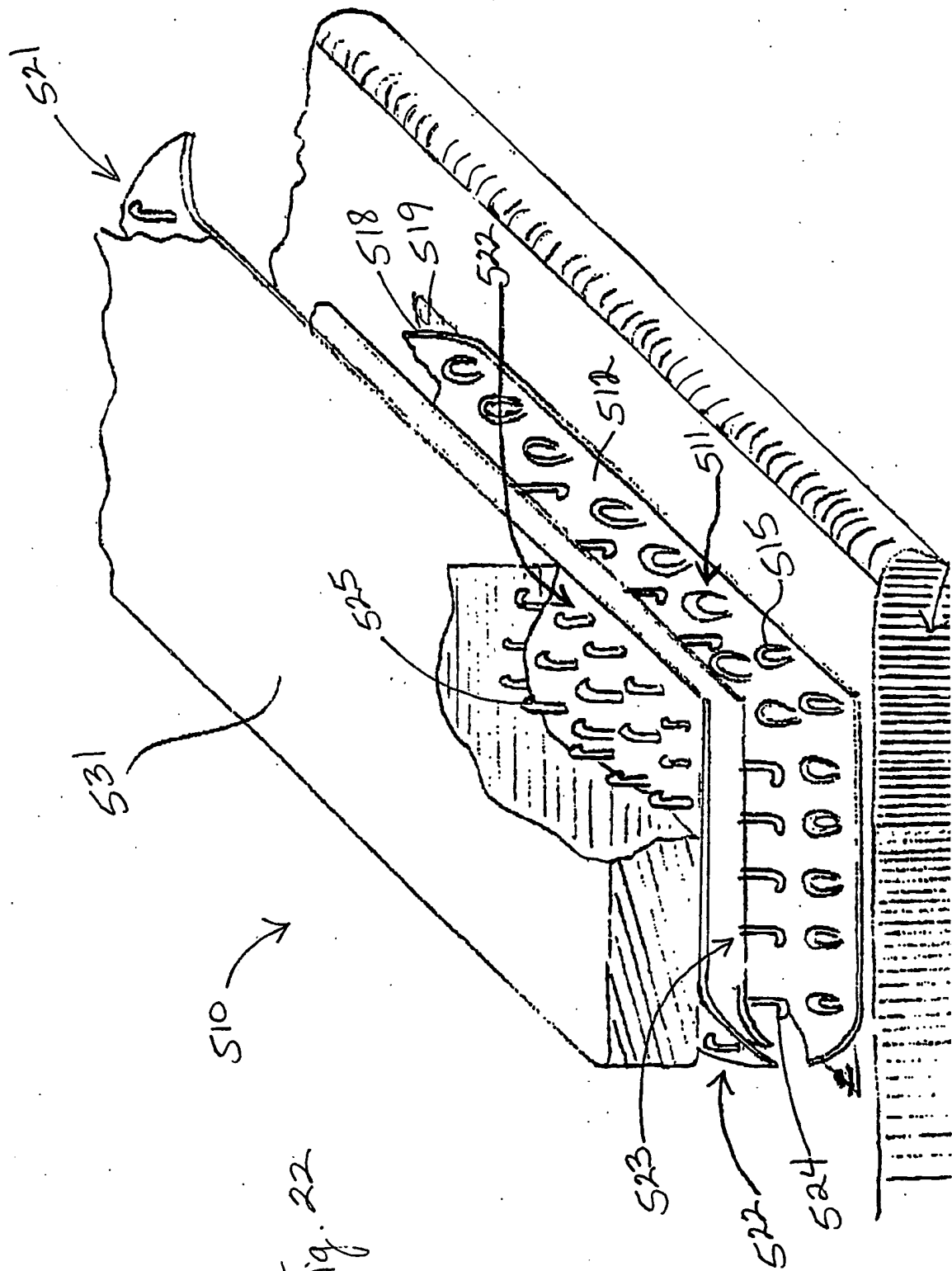
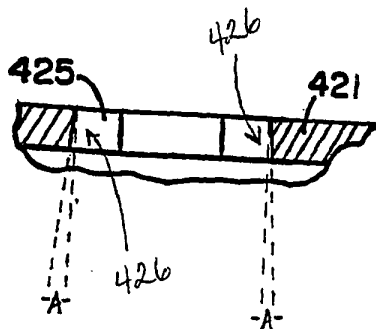
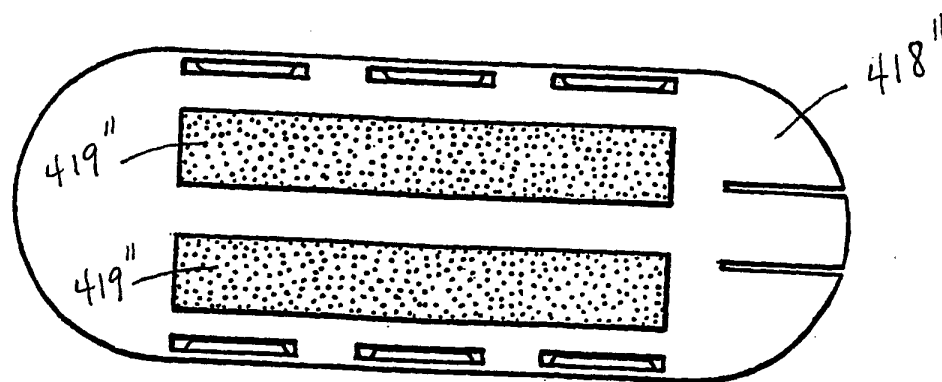
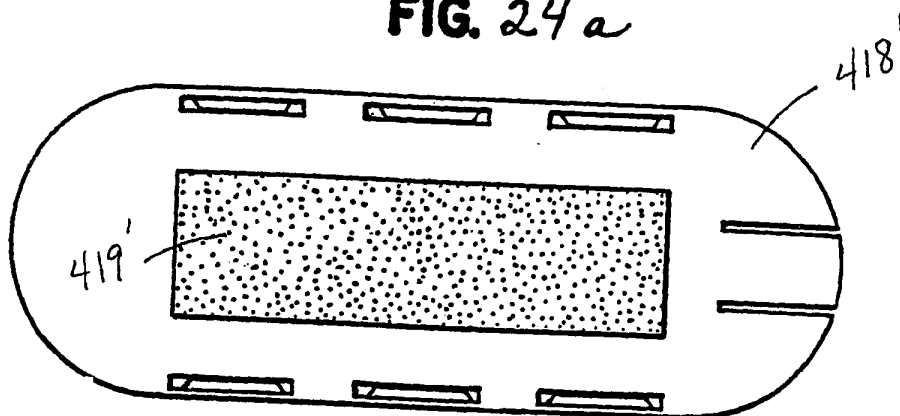


Fig. 22

**FIG. 23**

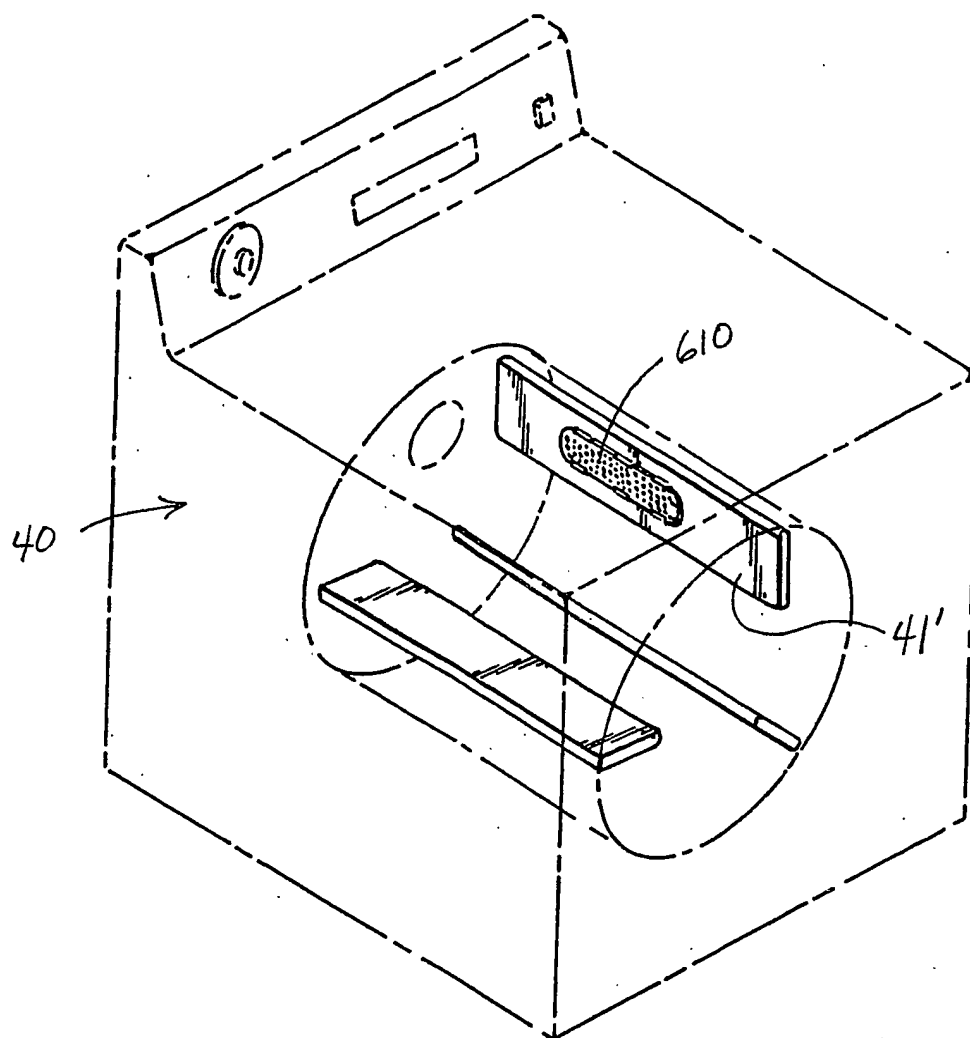


**FIG. 24 a**



**FIG. 24 b**

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**FIG. 25**

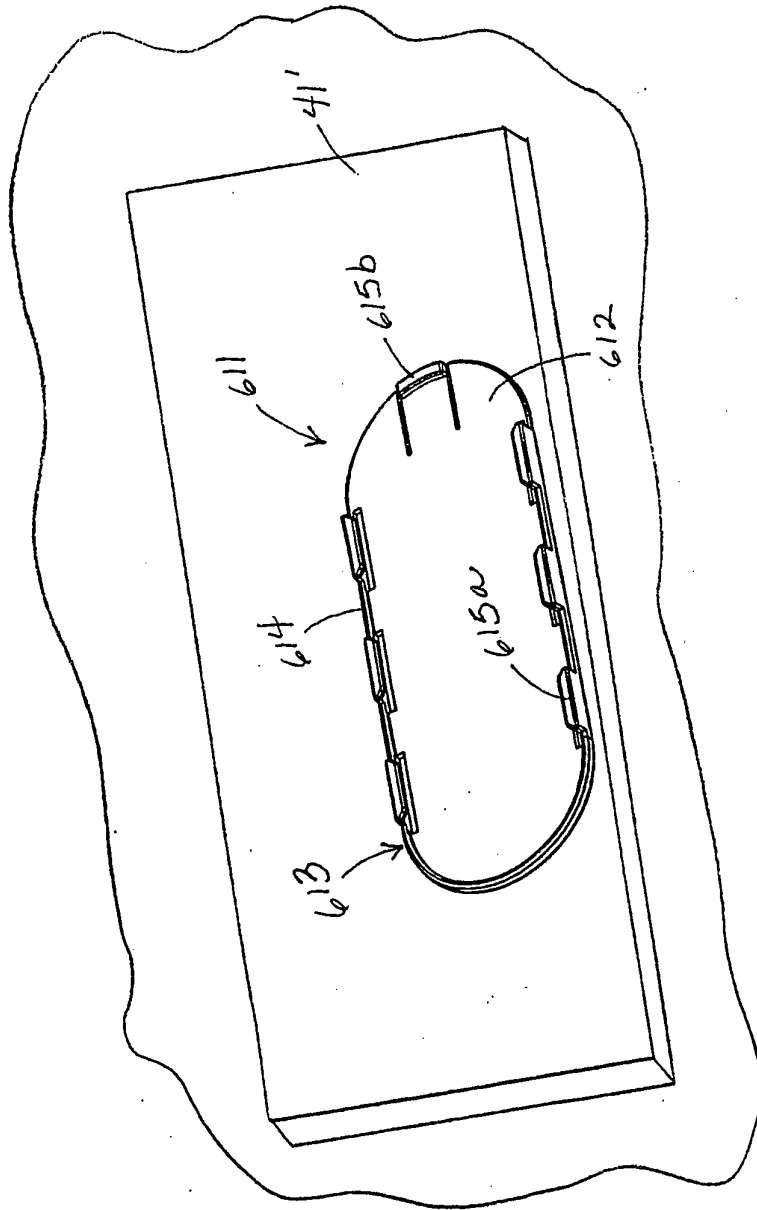


Fig. 26



## INTERNATIONAL SEARCH REPORT

Inte: 1st Application No

PCT/US 03/10892

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 D06F58/20

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 D06F D06M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 105 813 A (MIZUNO WILLIAM G) 8 August 1978 (1978-08-08) column 4, line 25 -column 5, line 38 figures 1,2	1-4,7-29
Y	---	5,6
X	US 4 014 432 A (CLOTHIER GEORGE ERNEST ET AL) 29 March 1977 (1977-03-29) column 1, line 29 -column 2, line 66 column 9, line 10 -column 10, line 8 figures 10,11	25-29
Y	---	5,6
X	DE 23 50 574 A (COLGATE PALMOLIVE CO) 18 April 1974 (1974-04-18) page 5, paragraph 2; figure 2; example 1	29
A	---	5,6
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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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Date of the actual completion of the international search

4 July 2003

Date of mailing of the international search report

14/07/2003

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 03/10892

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	<p>US 5 020 240 A (LEE LING H)            4 June 1991 (1991-06-04)            column 1, line 40 -column 2, line 17;            claims 1,15; figures 3,8            -----</p>	1,25,29
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US 5020240	A	04-06-1991	NONE

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